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THE
AMERICAN HOME GARDEN.

BEING

PRINCIPLES AND RULES FOR THE CULTURE OF
VEGETABLES, FRUITS, FLOWERS, AND SHRUBBERY.

TO WHICH ARE ADDED

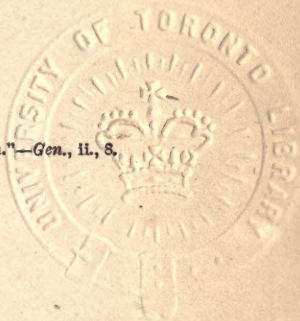
BRIEF NOTES ON FARM CROPS, WITH A TABLE OF THEIR AVERAGE
PRODUCT AND CHEMICAL CONSTITUENTS.

BY ALEXANDER WATSON.

///

Illustrated.

"And the Lord God planted a garden."—*Gen.*, ii., 8.



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DEDICATION.

To those young men and women of the Union who would make their present or prospective homes rich with the comforts, bright with the beauties, and fragrant with the sweets that a garden may be made to yield, this work is respectfully dedicated by their sincere friend,

THE AUTHOR.

P R E F A C E.

It is related of one Eliezar, in proof of the vastness of his knowledge, that "he made not less than three hundred constitutions concerning the manner of cultivating cucumbers." The author of the following work has no ambition to rival or to imitate Eliezar. He has aimed to present, in a digested and plain form, such directions and information as will, if applied, enable any one who has a garden to supply the home table with its pleasant and healthful products at the least possible outlay of labor and expense, and add choice fruits and flowers to the family stock of rational, cheap, every-day enjoyments.

He has sought to instruct his readers by general principles and directions rather than by extended details, believing that the good sense of those for whom he writes will readily and understandingly apply them, with or without modifications, as the circumstances of soil, season, or latitude may require. With much less labor he might have made a book twice as large, and not half as intelligible.

The time of planting the principal corn-crop forms an isothermal line throughout the various latitudes, and may therefore serve as a kind of equator for the cultivator in respect to the times, earlier or later, for putting in garden crops; and this circumstance has been, to some extent, taken advantage of in the directions given in this work, so that it will be found intelligible and suitable in any latitude or locality. Adaptation to this generality of use has also been consulted in the enumeration of insects, and their remedies or preventives.

The details of the culture of fruit, flowers, and shrubbery are

more fully elaborated than might otherwise have been deemed necessary, with the view of inducing our youth to give some attention to them; by their own skill and labor multiplying around the homes of their boyhood those pleasant associations and enjoyments, the fragrant and ever-blooming memories of which may yield them refreshment in the dusty road of after-life.

Additional interest might be given to such efforts by obtaining the seeds, or scions, or grafts from scattered school or classmates. With the cheap mail facilities we now possess, there seems to be no reason why there should not be, through this channel, an extensive annual interchange of grafts of valuable fruits, and flower and vegetable seeds, between the different parts of our country.

With the still farther hope that his book may find a familiar place in many a farm home, the author has added brief notes on farm crops, with the modes of estimating their value, etc., and a table of their chemical analyses.

In preparing the limited selections of the various fruits contained in this volume, the author has been aided by the treatises of Downing, Cole, Thomas, Elliott, and others. In the descriptions given of particular insects he has often availed himself of the reports of Dr. Asa Fitch, made to the Legislature of New York, on the noxious and other insects of the state, and the report on the insects of Massachusetts, made to the Legislature of that state, by the late Dr. T. W. Harris; while for most of the illustrative drawings which form an important feature of the work he is indebted to his wife, and has pleasure in acknowledging the obligation. His thanks are also due to the engraver for the general truthfulness and excellence of the illustrations, some of which presented peculiar difficulties in their execution; and to the publishers for the liberality and taste with which the work is got up.

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AMERICAN HOME GARDEN.

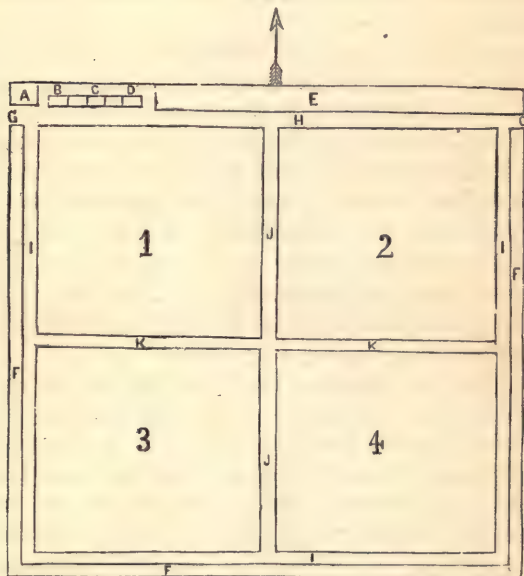
AMERICAN HOME GARDEN.

CHAPTER I.

Plan.—The Garden.—Form, Aspect, Fencing, Protection, &c.—Mechanical Preparation of various Soils, Draining, Plowing, &c.

PLAN OF GARDEN.

Fig. 1.



A, Garden House.

B, Pit.

C, Cold Bed.

D, Hot Bed.

E, North Border.

F, F, F, East, West, and South narrow Borders.

G, G, Entrances.

H, North Border Path.

I, I, I, East, West, and South Border Paths.

J, J, Centre Path north and south.

K, K, Centre Path east and west, temporary or permanent.

THE GARDEN.

FORM, ASPECT, ARRANGEMENT, &c.

THERE is, of course, no absolute rule for either the size, shape, aspect, or arrangement of a garden; each one may follow, in each of these respects, the dictates of possibility, convenience, or fancy. But, keeping in view the main purpose of this work as a directory for an American home garden, I have given a plan suitable for gardens of various sizes, and such directions for their general arrangements, as will, if adopted, economize labor, and afford facilities for successful culture.

It is desirable that the garden spot be nearly level, and if with a gentle descent toward the south or southeast, so much the better.

If convenience and other considerations permit, it is very desirable that your garden be located upon high and dry land, rather than in a low and more moist spot. In moist valleys, and even from the small dished hollows in a lot otherwise level and dry, the greater amount and rapidity of evaporation causes the early fall and late spring frosts, which so often injure crops. They result from the operation of the same principle upon which, by the rapid evaporation of ether, ice may be formed even in the sunlight of a summer day. They "fall in the hollows," as it is familiarly expressed, and are avoided by choosing an elevated and dry spot for the garden.

Should any one, disliking the simplicity of the plan given, desire to have his vegetable garden cut up into small beds or fanciful forms, he will find it easy to do it, or hire it done to his satisfaction. On the other hand, the "mechanical preparation" may be less thorough than that proposed, the "protection" omitted, and the "appendages" entirely dispensed with, and the garden be yet made to yield an abundant return, if the directions in regard to planting and culture are observed.

In form the garden may be square, or nearly so, an oblong form perhaps being preferable, of which the measurement east and west is somewhat greater than north and south.

The garden-house, if you should build one, with the other appendages described p. 26 and onward, should occupy the

northwest corner, and if the garden be not fenced on the north, as directed p. 17, a high, close fence must be continued eastward from the garden-house, at least so far as may suffice to shelter your pit (B), your cold bed (C), and your hot bed (D) from the northerly winds.

Eastwardly from the pit, &c., along the north fence, a border (E), ten or twelve feet wide, should be made for the raising of early and tender vegetables, &c. ; a portion of it may also be appropriated to early strawberries and asparagus.

To make it more suitable for these purposes, if the ground have no natural descent to the south, it should be made to slope by raising it gradually until the back of the border is six or eight inches higher than the front. It must also be kept in the highest possible condition by the application of warm, stimulating manures. (See p. 60.)

Entirely across the garden, along the front of this border, should extend a path at least six feet wide (H), at either or each end of which may be an entrance (G, G). In a small garden no other path will be found absolutely necessary ; but, if deemed desirable or expedient, a border three or four feet wide may be made along either side, or all the other sides of the garden (F, F, F), with accompanying paths two or three feet in width (I, I, I). In addition to these, a wider path may run north and south through the centre (J). On either side of these latter paths, and on the south side of the former, such articles as are ordinarily sown in small beds or plots may be raised, strawberry beds may be made, and the various fruit-trees and bushes which properly find a place in a vegetable garden may be planted, the whole being interspersed with such flowers and shrubs as may suit the taste of the owner. The relative positions and proportions of the different kinds of fruit-trees and shrubbery introduced may be varied to suit the individual fancy, but the aggregate should by no means be large, if we would have a garden that will yield full crops of choice vegetables. Nothing interferes more with the free growth and consequent excellence of vegetables than the roots of trees running in the same soil, the effect of which is often but erroneously attributed to their shade.

If thought desirable, additional temporary paths may be made, as at K, K in the plan, and edged with annual herbs or flowers for the season. These are to be disregarded in the spring plowing, and may be renewed or not, at will ; or, if the garden is dug and not plowed in the spring, they may be made permanent. All vegetables sown or planted in the garden, whether in rows or hills, should, if possible, be ranged north and south ; the making of small beds in the main divisions should be avoided, and the rows be as few and as long as the arrangement of the garden, and the necessity for fully cropping the ground will permit. This will save much otherwise wasted labor, and allow more readily of advantageously second cropping those portions from which early peas, &c., &c., may have been removed ; and with a farther view to this, crops that will mature early should be arranged together, so that as large a space as possible for recropping may lie in one spot, instead of having many mere fragments ; also, all crops that are intended to stand out over winter should be arranged in one section side by side.

All permanent paths should be edged either with box kept in order by an annual trimming with the dressing-shears, or with a narrow strip of sod, carefully prevented from spreading by the use of the grass-edger, and kept cut short with the grass-hook, or any hardy perennial plant of dwarf growth that will bear the necessary trimming without injury may be used for this purpose. If box is planted, though its smell is quite unpleasant to some persons, open a trench along the edge of the border into the pathway as large and wide as the ordinary furrow of a two-horse plow, the garden-line being stretched along the edge of the border, and the back of the trench cut square down by it, and perfectly true to the line. Old box edging, which will be a foot or more long, must then be taken and divided by tearing it asunder, or so spreading it that one yard will plant three or four ; lay in the butts across the trench toward the centre of the path, so that only one or two inches of the young growth may remain above the line. As it is laid in and held with the left hand, put earth upon it with the right, and either with the knee or foot press it solid and secure to its place, so bend-

ing the stems in the process as to bring the points almost or quite upright. After the whole is planted, fill up the trench, treading the earth lightly as it is filled in, and finish by a firm but shuffling tread along with one foot on each side of the newly-planted row, and close to it. It should then be dressed with the shears to an even height, and if the season prove very dry, water it until it is out of danger. If planted in the fall, the dressing should be deferred until spring.

FENCING.

Having determined the size and form of your garden, inclose it on the north and west sides with a high, close board fence, and on the east and south sides either with close fence or picket.

Hedges combining ornament with additional protection may be planted along the inside of these latter fences, and, if preferred, along the west fence also. They may be of arborvitæ, cedar, cypress, cydonia japonica, privet, pepperidge, the buckthorn, either European or American, the Washington thorn, or the Osage orange; to which list may be added, for the warmer latitudes, the sweet bay, the euonymus japonica, the pomegranate, and others. The common and honey locusts, though beautiful, grow too strongly for this purpose; and the hawthorn, though effective where security is the chief object, is excluded by its unsightly appearance in summer and fall. In making young hedges, the plants may be set either in a single row at six inches apart, or a foot apart in a double row, and alternated so that the actual intervals will still be only six inches; and if the plants are slightly sloped in the setting out, the growth will probably thicken sooner. Trim them annually, in fall or spring, with the dressing-shears (Fig. 92 *a*, p. 209).

PROTECTION.

Whether hedges are planted or not, if you would make the thing perfect, unless hills or woods already protect it, plant a belt consisting of a double or triple row, or more, of evergreens, of such varieties as you may prefer, along the outside of the fence on the east, north, and west sides. Let this belt over-

lap at the entrances, so as to exclude all winds except the southerly. Set the trees pretty closely together, and the protection afforded when they grow up will enable you to sow and plant with safety from one to two weeks earlier than would otherwise be expedient, and in a majority of seasons the maturing of your crops will be equally advanced. The birds, too, your best friends in garden or orchard, will winter with you, which friends do not always, and be ready to enter with you upon the labors of spring.

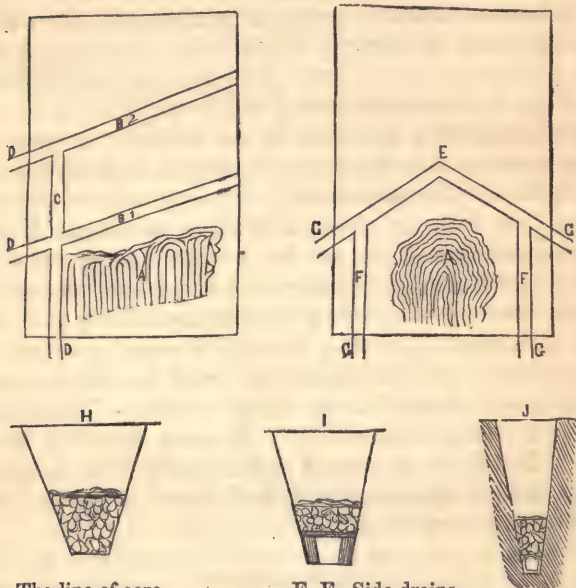
MECHANICAL PREPARATION.

In making a new garden, it is desirable, if it be possible, to effect whatever mechanical preparation it may require before fencing it. If the plot selected be a deep rich soil, free from stone, a thorough and deep plowing is sufficient. If a deep free soil and subsoil, but not rich, manure heavily and trench-plow it. If the soil be shallow, and the subsoil very compact, or a hardpan, yet free from stone, manure heavily and trench-plow as directed (page 23), running, however, a subsoil plow ahead of the second stroke, and following it with the same to loosen it still deeper, if you think expedient. *See* SUBSOIL PLOWING. A subsequent cross-plowing with the common plow, followed by the subsoiler, will perfect the preparatory work. Should the soil of your garden plot be stony, it must be trenched at least eighteen inches deep, and all stones taken out that are too large to be gathered by the rake in the course of ordinary cultivation; but if trenching is found necessary, it may be done in sections at any time after the plot is fenced. If the soil of your plot is a moderately light loam, when enriched it will become a perfect garden soil. If it be strong loam, repeated and high manuring with stable and other stimulating manure will steadily improve it. If it be heavy loam or clay, cart on sand or road-wash as freely as you can from time to time, and manure often and highly. If, on the contrary, the soil is sandy, cart on loam or clay, and mix it well by repeated plowing and harrowing, using at the same time cow and hog manure, leached ashes, marl, or swamp muck, avoiding the use of barn-yard or stable manure, unless in compost, or when perfectly rotted.

In estimating the quantity of sand or its opposite required for changing the mechanical character of soil, it may be reckoned that 247 cubic yards of earth will cover an acre to the depth of two inches.

DRAINING.

Fig. 2.



A, A. The line of ooze.

B, B. Diagonal drains.

C. Side drain.

D, D, D. Points of discharge on the surface.

E. Double pitch drain.

F, F. Side drains.

G, G, G, G. Points of discharge on the surface.

H. Blind ditch.

I. Covered stone drain.

J. Covered pipe drain.

It is sometimes found necessary or convenient to make a garden in a wet spot. In such a case, draining, though requiring considerable labor, is indispensable.

If the spot be a dead level, in which it is only necessary or possible to sink the water from the surface, surround your garden on the outside of the fence with an open ditch of such

depth and width as you may deem sufficient for the purpose, always making the depth of your open ditch equal to its width at the surface, and grading the sides so as to make the width of the bottom equal to one third of the depth. If required, let blind ditches or covered drains, as deep as the open ditch, and discharging into it, be made to underlie the intersecting paths, as J, J, K, K in the garden plan. Upon descending ground, the main drains or blind ditches should not be made either parallel with the slope or at right angles to it. In the former case they will be of little service, and in the latter will be liable to stoppages from want of current, which may convert them into mere dams, forcing the water to the surface at a lower point. If, then, the ground of your plot be sloping, and the water oozing to the surface, note carefully the upper edge of the line of ooze (A, A, Fig. 2), which is simply the natural drainage, whose current flows always in the direction of the ground slope. At an average distance of twenty feet above the upper edge of the ooze cut a blind ditch or drain three or four feet deep (B 1, Fig. 2), running diagonally across the plot to the side drain, C; or if it can be done with less labor, omit the side drains, and carry it outside of the fence, letting it discharge upon the surface at D. This may either be doubled, as B 1, B 2, D, D, or changed in form, as E, F, F, G, G, G, G, the latter mode being especially useful when the wet spot is in a hollow or dishing form.

BLIND DITCHES.

A blind ditch (H) should be cut in the same form as above directed for the outside open ditch around the garden plot; when it is thus opened, throw in by hand small loose surface stones, say from one to ten pounds in weight, until it is one third or one half filled with them; over these lay small brush, or shavings, or straw, or sod with the grass side down, and fill up with the earth that came out, rounding it a little directly over the drain to prevent surface water settling into it while the work is fresh.

COVERED DRAINS.

These are formed by setting flat stones edgewise along each side in the ditch, and fitting a covering of the same to rest upon them. Over this hollow drain, stones, such as are suitable for blind ditches, may be thrown, so far as seems convenient or desirable, the whole being covered with the earth and rounded as above directed for the blind ditch, thus combining the advantages of both forms of draining (I). The ditch for a covered drain need not be cut so wide at the surface as an open or a blind ditch, but may have the sides nearly perpendicular; and where flat stones can not be readily obtained, the drain-pipes or tiles made by the potters may be used (J).

PLOWING.

The plow and harrow, wherever it is practicable to use them, are the most efficient known instruments in the proper preparation of the soil for the reception of seeds or plants. Much has been said and written to demonstrate the superiority of the spade, but it has not come into general use as a substitute, and is now less likely than ever to do so. Repeated deep, narrow-sliced plowing and thorough harrowing are, beyond question or comparison, the best means that we possess for thoroughly pulverizing the soil, and so reducing its particles as to prepare them to enter into the composition of plants. *How to plow well must be learned.* Happy the youth who, to his other learning, willingly adds this. Plowing should be performed when the earth will crumble as it is turned up. The old Roman maxim, "Plow stripped, sow stripped," is a good, though not an absolute rule. Fall plowing, either plain or ridged, may be done without injury, even though the ground be pretty wet and the weather cold, the frosts of winter counteracting the ill effect that in other circumstances would result. But the cultivator who in spring turns up a wet, smooth, heavy furrow-slice to the bright, strong sun, will find his season's labor largely increased or his crop a failure.

Plowing should be performed with a strong team. On all good soils, and especially in a garden, it should be from twelve

to fifteen inches deep. What is called "cut and cover" plowing must be carefully avoided. The furrow-slice should be narrow, not much exceeding two thirds the width from the fore end of the land-side to the outer corner of the share. It should not be laid over quite flat, but at an angle of about forty-five degrees, which, for the benefit of very young readers I remark, is represented by each pair of lines radiating from the centre of this star ✱. No care need be taken in plowing to fill any irregular holes that may happen to remain, nor effort of any kind made to help the plow perform its work, unless it be to foot over an obstinate tussock or sod. Smoothness is not an excellence in plowing. The land so plowed should be left for a time in its rough state, open to the influence of the sun and air; when, after thorough harrowing, it may be re-plowed or dug, as may be found suitable for the particular crop.

HARROWING.

Harrowing should be done after the land has lain plowed a week or more, as it may require, and, if practicable, when the surface soil is not dusty, but only moderately dry and perfectly friable. The "trituration" and reduction of the soil by the harrow will be more perfect when in this state than if quite dry; and if it should be wet, the harrowing must not be done except under a pressing necessity.

The first stroke of the harrow should always be "with," or in the same direction as the furrow; the subsequent strokes crossing it and each other at right angles, or obliquely, until the work is satisfactorily done.

RIDGING.

Ridging is performed with the common plow by throwing two furrows together, which thus meet upon and overlap a space about as wide as each of them; or with the spade, by digging the two furrows, and laying the earth up in ridge form upon the intervening space. In very light soils, which, however, should never be ridged for winter, or in the preparation of plowed land for crop ridging, the work is sometimes done by the use of a large and pretty strong double-mould plow, which seems to save half the labor, but seldom does its work well.

Strong loam or clay land, which, if plowed or dug in the fall and laid flat, might be injured rather than benefited, is greatly improved by careful ridging for winter, particularly if lime, ashes, or manure, or all of them, be previously applied, and are covered up or incorporated in the process of ridging.

SUBSOIL PLOWING.

In subsoil plowing, a deep furrow turned with the common plow is followed by another in the same track with the subsoil plow (Fig. 17, p. 39), which, being without mouldboards, simply loosens the subsoil without throwing it up to the surface. The convenient and obvious mode of performing it is to have two teams, the one with the subsoiler following the other in its rounds.

The depth of the two furrows may easily reach eighteen inches.

TRENCH PLOWING.

Trench plowing is performed by two teams following one another, as in subsoiling, but with common mouldboard plows, the mouldboard of the last, or trench-furrow plow, being generally somewhat longer than the first. It may, however, be well done with a good plow and one team, by simply plowing first to the depth of nine or ten inches, and repeating the stroke in the same furrow with longer gearing. It should be done with a steady team, and the plow be driven as deeply as two strokes in the same furrow can be made to carry it.

TRENCHING.

Trenching may be performed on a small or large plot with equal proportionate convenience. If, therefore, it is found necessary to the proper preparation of the garden plot, it may be deferred until the fencing is completed, or even be done gradually through a series of years, after the garden is used.

It consists simply in marking off from the end or side of any given field or piece of land of even width a strip, say two feet wide, and digging it out, and carting it or wheeling it to the opposite end or side, where it must be laid in a row all along,

that it may be ready to fill up the last trench at the completion of the job, the earth that comes from the bottom layer or layers being dumped in a separate ridge, a little beyond that taken from the surface, so that the latter may be conveniently put first into the bottom of the last trench.

If the depth proposed be eighteen inches, let the spade be driven full ten inches deep in taking off the first layer; then, with a good sharp shovel, let the "crumbs" or loose earth be taken out, cutting the bottom a little as you go, which will deepen the trench another inch; then dig another spade-length deep, and the work is done.

If, however, the subsoil is so hard that the second layer can not be dug out with the spade, the pick and shovel must be used, and if the necessary depth can not be attained by one operation with these implements, it must be repeated.

Having this first trench completed, another equal space is marked off, and another, and another, to the end, the earth from each being regularly turned over into the excavation that preceded it, by a precise repetition of the process of digging and shoveling above described, the surface-earth being thrown into the bottom of the trench, and the lower stratum on the top of it, with some care to keep the side of the loose earth laid up square, and the top of the new layer nearly level, until you come to that which was carted back, which fills up and finishes the whole.

By this operation the body of earth is more completely turned upside down than is possible in plowing; and in the process stones can be thoroughly gathered out, and any desired quantity of manure may be mixed in by spreading it upon the successive layers after they are turned into the trench. If the soil is really poor, this should not, on any account, be neglected.

DIGGING.

In certain circumstances we must resort to digging instead of plowing, and in the garden, particularly, it is almost exclusively used in the preparation of the ground, or in working between certain crops in wide rows. It is performed with the spade (Fig. 37, p. 48), or a strong fork made for the purpose, and

called a spade-fork (Fig. 50, p. 54). The depth of digging, in experienced hands, seldom exceeds ten inches, and the inexperienced will rarely go so deep. A careless digger will sometimes make the thickness of his spade-slice equal to its depth, and, in consequence, will very imperfectly move much of the lower portion of it. As a general rule, let the thickness of the slice be equal to half the length of the blade you use, and the work will probably be well done.

If the handle of the implement used be not too long (Fig. 37, p. 48), digging affords perhaps the very perfection of bodily exercise for the convalescing invalid or the dyspeptic. It gives exercise to the chest and abdomen, and calls almost every muscle of the body into action, yet is so entirely measurable in its degree that it may become the amusement of a child or a task for a strong man.

As with the plow, so with the spade, land may be properly dug or ridged in the fall, even though it be pretty wet. But in the spring the earth should not be dug when the surface is wet, nor until, on being turned up, the body of the soil is found friable. The first spring digging in the garden should be roughly but effectually done, no care being taken to break it up smaller than "egg coal" or "rubble." After lying in this state till it is warmed through, it will be found an advantage to "chop it over" as deeply as possible, either with the hoe or potato-hook. It may then be roughly raked preparatory to the second digging, or, if it be clear of stones and bad weed-roots, this raking may be omitted.

When dug a second time, in preparation for the seed or plants, let the digging be more carefully performed, and the soil well pulverized in the process. If afterward, from the occurrence of sudden beating rain, or other cause, it seem desirable to repeat the operation of chopping over, let it be done, and having given it a finish with the rake, it will be ready for sowing or planting.

CHAPTER II.

Appendages.—Garden-house, Pit, Frame, Cold Bed, Hot Bed, &c.

APPENDAGES.

GARDEN-HOUSE.

A SMALL garden-house, say twelve feet wide by twelve or eighteen feet long, with earthen floor, is a convenient and desirable appendage to the garden, for storing garden-pots, compost for choice plants, and tools when not in use. It serves also for various purposes of in-door work, as repairing implements, potting plants, sowing in pots when desirable, preparing cuttings, &c. If built in the garden, which it ought to be, it should be so placed as to form the northwest corner of the inclosure, having a shuttered window or two to the south and north, and a door in the east end. Inside, a work-bench should run almost or quite along the front or south side. On the right, near the door, should be fixed a bar or slat, upon which to hang rakes, hooks, and hoes; also nails or pins for thrust-hoes, spades, &c. A few shelves along the back, for such purposes as they may be found to serve, will complete the internal arrangement.

The garden-house, though convenient, is not indispensable, if a cellar or any of the ordinary out-buildings can be used instead. On the other hand, if built, it may be furnished with a cellar for storing fruits and vegetables, and a frost-proof dark room for choice pears, &c.

PIT.

The pit is a sunken frame-work, covered with glass, protected by shutters or mats, but without artificial heat, and may be of wood, brick, or stone.

To make a pit for three sashes, such as are commonly known as hot-bed sashes, choose a spot that will enable you to front it to the south or southeast. Dig out the earth about six feet

wide and ten feet long to a uniform depth of eighteen inches ; within this make a frame of thick plank, or slabs hewed to fit close, and nailed firmly to locust or chestnut posts. These posts should be three and a half feet long for the back, and two and a half feet long for the front of the frame, thus allowing it a slope of one foot, to which, of course, the ends must suit. Its inside width, when completed, will be about five feet, and its length about nine feet. Pack the earth lightly around it, taking care to keep the frame at right angles ; then, with a drawing-knife and plane, finish the upper edges of the whole with a smooth, even slope. Prepare two cross-bars or slides for the sashes to run on, made of two strips of stout plank, three inches in width, each having along its centre a thin strip of the same width nailed firmly edgewise, to serve as a sash-guide ; nail a corresponding strip on the outside of each end plank to serve a similar purpose, the ends themselves serving as slides. Having measured off the frame accurately into three divisions of equal width in the clear, notch or dovetail the plank cross-bars or slides into the frame flush with its back and front edges, carefully preserving the proper width of the divisions, so that each sash, when put on, will lie perfectly fair and snug in its place. Immediately underneath each of the two cross-bars, and fitting closely up to them, you may, if you please, set a rough plank or board partition, thus dividing the pit into three separate compartments. The packing of the earth around the frame may now be more thoroughly done, and, as a protection against some degree of cold, bank earth thickly around the pit up to within an inch or two of the edge of the frame, treading or beating it as you go to make it solid, and sloping the bank carefully so as to shed water. This done, fit on your sashes properly, and cover them with board shutters or thick straw mats (see p. 37), or both, and your pit is ready.

As the pit is calculated to be a permanent appendage to the garden, it is plain that brick or stone is greatly to be preferred for making it. If laid up dry with common farm stone, and well pointed or plastered, it will last a lifetime ; but in this case, or if built of brick, it will require a frame or plates for the sashes, which may be made of good three or four by six inch

pine timber, well set in mortar upon the walls, and thoroughly painted.

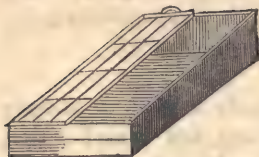
A pit is intended to serve as a place for wintering half hardy and even tender plants, and for blooming roses and other flowers earlier and later in the season than would be practicable in the open ground. For these purposes, the pit may be partially filled with leaves from the woods, tan, sawdust, sand, or spent manure well pulverized. If the pit is too deep for the plants, so much filling must be used as is needful to bring their tops to within ten or twelve inches of the glass, the pots being packed or set thoroughly into it. A pit thus filled should have light, and a little air admitted about noon of every bright winter day that is not too intensely cold to permit it with safety, increasing the amount of these as the mild days of early spring come on, until it becomes safe to uncover it entirely to the vernal showers. It should be occasionally examined through the winter, and defended against mice, which are apt to nest in it.

When divided into compartments, as above suggested, the pit may readily be put to various uses. In one of these the spring hot bed may be made more easily and with less manure than when made in the common mode. For this purpose the manure should be evenly and solidly laid, as directed for hot beds, p. 30, to the depth of eighteen or twenty inches, which being covered with the usual depth of rich earth, will bring up the surface sufficiently near to the glass and into the sunlight. If two compartments are used for hot beds, the additional advantage is gained of being able to classify your plants, sowing the hardier varieties, as cabbages, salad, &c., in the one, and in the other the tenderer, as pepper, egg-plant, &c., which require greater warmth and more careful treatment. (See Hot Bed.) One or more compartments of a pit may, if found desirable, be used as a "cold bed," requiring only to be filled up with rich earth or compost to a little higher than the natural surface of the ground, and then treated in all respects as directed p. 29.

GARDEN-FRAME.

The garden-frame is usually made of inch and a half plank,

Fig. 3.



eighteen inches deep at the back, and nine inches at the front, the ends being gradually sloped to suit. A convenient width is about five and a half feet, though this may vary. The frame is divided by cross-bars three inches wide, notched into the upper edges of the back and front of the frame at say three feet one inch apart from centre to centre, with a thin centre-board or sash-guide standing edgewise, from an inch and a half to three inches high, along each, the two ends of the frame having strips nailed on to serve the purpose, as directed for pit, p. 27. Frames are sometimes made to hold three or four sashes, but it is more convenient to handle those made for only two, several pairs of which can be set together, if a longer bed is required.

The frame is carefully and strongly nailed together, or each part is cleated at the corners, and drawn closely together with hooks or links and staples, so as to be readily taken apart.

To suit the dimensions of the frame named above, the sashes, which should be of inch and a half stuff, require to be about five feet nine inches long and three feet wide, having either five rows of six-inch glass or six rows of five-inch, in either case each sash containing about fifteen feet of glass. This should be of good quality, flat, and strong, and in the process of glazing the panes should overlap as little as possible, say one fourth of an inch at the most; or, if the glass be of superior make, the width of the lap need not exceed the thickness of the pane.

The garden-frame so made and sashed is used to form of itself a cold bed, or to place upon a hot bed for the purpose of raising early plants, &c.

COLD BED.

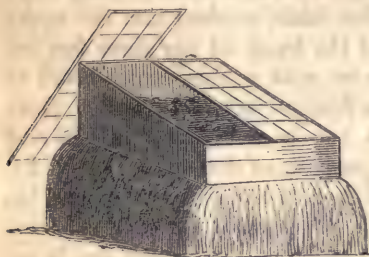
A cold bed is made by simply setting a garden-frame (Fig. 3, above) in a favorable spot for your purpose, whether you desire sun or shade; or it may be stationary, and provision made for shading it at will. For winter protection it should

be banked around as directed for the pit (page 27), and is used for the same general purposes where depth is not required.

HOT BED.

Take fresh stable manure that is ready to heat or already

Fig. 4.



heating, and spread a thin layer of it upon the ground, of the size and form of the bed you wish to make, calculating this always full one foot longer and wider than the frame you intend to set upon it. On this spread other layers, mixing the long and short manure to-

gether, and shaking it perfectly out of all large lumps or bunches in the process. Keep it equally packed and level by beating it over regularly, but not heavily, with the back of your four-pronged fork at about every third layer, filling up any soft spots or hollows you find.

Keep the edges true and the corners firm, and when it attains the desired height, shovel up the loose fine manure around, and spread it evenly over the top. Set on your garden-frame with care, and fill in with rich earth, not throwing it in heavily or in heaps, but spreading it lightly and evenly to the depth of four or five inches. Rake the surface, sow your seeds in drills about four inches apart, and put on the sashes. Some defer sowing until the bed heats, but it may be safely sown at once; and when the heat rises give plenty of air, not by sliding your sashes down, but by raising them at the back, having a longish triangular block or piece of plank to tilt them upon, so that you can open them with it two inches or five.

In sowing your hot bed, let peppers, egg-plant, and other tender plants be sown together or under the same sashes, and cabbages, lettuces, &c., under others, so that they can receive more or less airing as they may require; or set a thin board, as a temporary partition, between them, under the cross-bar of the frame. Shade the bed until the plants are well up, and water

regularly, but not heavily, toward evening, with water that has been warmed in the sun or by the fire—say to the temperature of fresh-drawn milk—and cover the sashes at night with shutters, and bass or straw mats, or other sufficient covering.

Give air abundantly, but never suddenly, throughout the time your plants remain in the bed, uncovering them entirely during the day and in mild nights for a week or ten days before they are set out. If you pot your plants, or transfer them to a second hot bed, the treatment should be the same. The ordinary time for making hot beds near New York is from the middle of February to the middle of March; but the proper time can be calculated any where by making the hot bed from six to eight weeks before the plants are needed to set out.

CISTERN.

Wherever it is found necessary or desirable to have the appendages to the garden complete within itself, a cistern of such size as may be deemed suitable should be constructed in the ordinary manner, to receive the water from the garden-house or any neighboring out-building. Its dimensions may be six feet deep and five feet diameter, or nearly 900 gallons capacity; or eight feet deep and six feet diameter, which will hold about 1600 gallons; or larger if preferred. A cheap and yet durable cistern may be made with the aid of an ordinary workman by digging a hole of the necessary size, covering the whole bottom with a thick layer of small stones, filled in, or rather mixed, with hydraulic mortar, prepared for use in the ordinary manner—that is, allowing two barrels of sand to each barrel of first-rate cement, and packing them solidly with a rammer. Upon the floor thus prepared set a rough plank frame, such as is often used in well-digging to prevent caving in, but leaving a space sufficient for the cistern-walls between the frame and the surrounding earth, and brace the frame thoroughly on the inside.

Having provided a supply of rough stone, such as are commonly gathered by hand from the lots or road sides, proceed to fill up the wall-space around the frame with them in regular layers, mixed, like the bottom, with hydraulic mortar, and.

rammed moderately, but so as to make it solid. Each layer should be carried entirely around the frame before ramming, care being taken to ram evenly, that the pressure on the frame may be kept equal; and the whole work should be done as rapidly as possible, mixing the mortar in small quantities as wanted, that the settling and drying may be uniform. In the course of ten days remove the frame-work, plaster the whole thoroughly with cement mortar, made with one third sand and two thirds cement, and finish the whole by putting on the top.

Should leaks occur subsequently, they may be stopped by a coat of thin cement, laid on with a whitewash-brush.

ICE-HOUSE.

An ice-house for family supply may be made of the same size and in the same manner as a cistern, having a draining-floor formed of rough joists or plank, under or between which a few inches open space is left at the bottom when the ice is put in, with a waste-pipe leading from it, having a plug by which it may be closed at its outer end. Or it may be built in a dry soil as a small cellar, with the above provision for drainage, and be closely covered by setting a roof or building over it. Or it may, if preferred, be built entirely above ground, with double siding of boards or slabs, the space between being packed as directed for green-house, which see.

It should be substantially braced, and provided with an inner and outer door; the space between these, together with the whole roof or floor covering it, in whatever manner it is built, should also be packed as directed for the sides. The draining-floor being first thickly covered with straw, the ice may be set in snugly in blocks, the spaces between them being filled with the fragments rammed solidly in; or, if thin ice is used, the whole may be broken up and rammed, water being added from time to time to fill the crevices by its freezing; the mass must be kept a little raised in the middle as the filling progresses, and the sides should be lined with straw set upright. When it is completed, the whole must be thickly covered with the same, or with sawdust, or salt hay, and kept securely closed until the ice is wanted. Not less than from forty to fifty

loads or cubic yards of ice should be relied on to keep well in a house built entirely above ground. In the cellar or cistern form a much smaller quantity may be preserved; but in all cases, the larger the aggregate mass, the better it will keep.

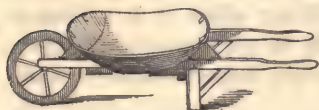
TANK.

A tank sufficient for the purposes of a small garden may be made by sinking a water-tight tierce or hogshead into the ground, and covering it safely, having first pitched it within and without. For larger gardens, or where a more permanent tank is desired, it should be built in the same manner as a small, shallow cistern, having a sufficient opening to allow of stirring the contents or adding to them, but which ordinarily must be closely covered.

For the purpose of stirring, it will be found very convenient, and not expensive, to set in the centre of the tank a shaft furnished within the tank with two or three pairs of arms nearly equal to its diameter. The upper end of the shaft should project four or five feet above the cover, and having a two-inch hole through it near the top, the contents of the tank may be easily stirred by turning it with a small bar. Into this tank the soap-suds and other waste water from the house should be conveyed, for the preparation of liquid manure, if needful. See page 64.

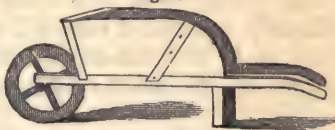
WHEELBARROWS.

Fig. 5.



Canal Wheelbarrow.

Fig. 6.

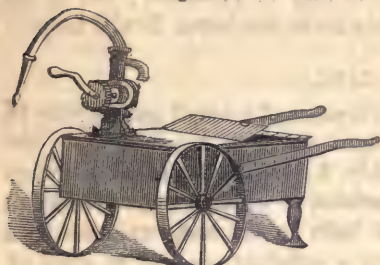


Box Wheelbarrow.

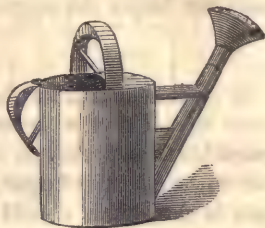
The common canal wheelbarrow, Fig. 5, is very much to be preferred for general purposes, though in most gardens the box form, with loose sides, Fig. 6, or something nearly similar, is still generally used.

GARDEN ENGINE, WATERING-POT, AND SYRINGE.

Fig. 7. GARDEN ENGINE. Fig. 8. WATERING-POT. Fig. 9. SYRINGE.



Garden Engine.



Watering-pot.



Syringe.

The garden engine, Fig. 7, is a small force-pump, with a pipe or hose of any desired and suitable length, placed in a barrel or water-tight box, and fitted upon a wheeled frame for the convenience of removal at will to any part of the garden. It is used instead of watering-pot and syringe.

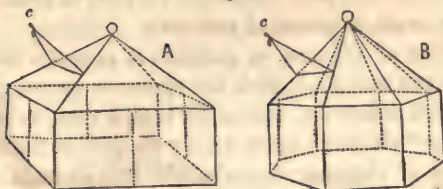
The watering-pot, Fig. 8, requires no description. It is used with or without the rose, and a convenient size for use will hold about twelve quarts.

The syringe, Fig. 9, is commonly of brass, having a small, delicately perforated rose (a), without which it is seldom or never used. It is calculated chiefly for syringing plants in the green-house, &c., which would otherwise suffer from the dry heat.

HAND AND BELL GLASSES.

Hand glasses, Fig. 10, A, B, are made of various dimensions, from six to eighteen inches in diameter, or larger, and of divers forms, being square or many angled, conical or flat, deep or shallow. The frames are usually lead, sometimes strengthened by an iron bottom band, and the glass and glazing are ordinarily of the first quality. A small hinged venti-

Fig. 10.



Hand Glasses.—A, square; B, octagon.

Fig. 11.



Bell-glass.

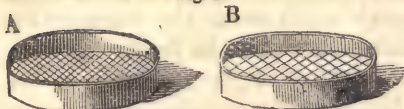
lator (*c, c*) is sometimes made in the top, which, with a slight tilting of the lower edge, permits of airing the plants without uncovering them. They are used for covering newly-sown and delicate seeds, and newly-made cuttings, to prevent too rapid evaporation, or for protecting tender hilled crops, as early melons, cucumbers, egg-plants, &c.

Their general purposes, particularly for hilled crops, may be answered by an oblong or square wooden box, with a slight pitch to its upper end, over or into which a single large pane of glass is made to slide in small side grooves, so that it may be opened at pleasure, forming, in fact, a miniature garden-frame.

Bell-glasses, Fig. 11, are used for the same general purposes as small hand-glasses, viz., to hasten and secure the vegetation of seeds of special character, and, in case of certain cuttings which do not root readily, to prevent exhaustion before they become prepared to obtain new supplies. They are not glazed, but blown, and sometimes need watching and shading, lest their concave surface become a burning-glass to the young plants they cover.

SIEVES.

Fig. 12.

A, $\frac{1}{2}$ inch mesh sieve; B, 1 inch mesh sieve.

Sieves are distinguished by the number of meshes woven to the inch.

The opposite figures represent Numbers 1 and 2, or inch and half-inch mesh, which are the only sizes needed in the garden or green-house; and even these may be well dispensed with, unless in extraordinary cases, as where

stones abound in flower compost, or for the purpose of reducing and mixing guano or other powerful manures.

In the preparation of compost in general, it is much better to mix and reduce the materials with the spade or shovel than with the sieve, which takes out the small lumps that, to most plants, are the very "tit-bits" upon which their roots fasten.

For the purpose of cleaning flower-seeds, &c., at least two small sieves, of about a foot diameter, will be found useful; one should be No. 12, and the other No. 16, to which others, coarser or finer, may be added, if desired.

FLOWER-POTS.

Flower-pots are designated by their capacity, as half pints (a), pints (b), quarts (c), &c.



They are sometimes made too deep for their diameter, or too tapering toward the bottom.

The proportion of their diameter to their depth should be at the top as one to one, and at the bottom as two to three.

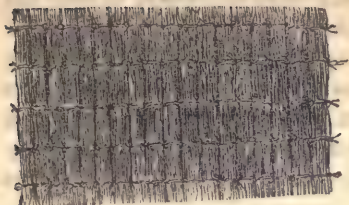
These proportions are nearly represented in Fig. d.

They should never be glazed or over-burned, by which plants in them are injured, probably from exclusion of air, but should have the ordinary porous texture of sound brick, through which air passes, and evaporation and absorption proceed naturally. The drainage-holes in the bottom should range from a full half-inch diameter in the "quarts" to a full quarter inch in the very smallest size. In rooms or on fancy stands they are placed in saucers (as Fig. c), which catch the drainage, but the water should not be allowed to remain in them.

STRAW MATS.

Straw mats (Fig. 14) are convenient and valuable for frame sashes, whether used for winter covering of pit or cold bed, or upon the green-house or spring hot bed. They are easily and quickly made, even by a boy, and may be rather wider and lon-

Fig. 14



ger than a single sash, so that they may overlap, if need be. For a mat intended to be four feet wide, take strong, well-twisted hempen string, about the thickness of a straw, and stretch five strings at ten or eleven inches apart, or six at eight inches, from a bar near the floor upward to another bar or beam six or seven feet above; strain them tight, and fasten them securely to nails or pins driven for the purpose. Knot firmly on to each of them, just above the lower bar, a second string of the same size, or a little smaller, and only three or four feet long, for lacing-strings, which you can add to as you find necessary in the progress of the work: these are left hanging loosely on the floor. Next provide a quantity of pretty long straw; place it upon your left hand as you seat yourself like a basket-maker in front of the stretched strings. Take about a boy's handful of the straw, and place it with the butts projecting a few inches outside of the outer string, and lace it to its place by the second or third lacer, passing this around the stretcher, and fastening it with a half-hitch knot; take another handful for the other side, and lay it in with the heads inward, so overlapping the former as to make the whole layer even; fasten it in place, and proceed to lace clear across the mat. Take other equal quantities of straw, and lace them in in the same manner until you attain a height equal to the desired length of your mat. Having fastened your last lacing, cut the stretchers, and tie the ends securely; then lay the mat at length upon the floor, and, with a board or slat for a straight-edge, cut the projecting ends so as to make your mat of the desired width, leaving the ends of the straw not more than three inches beyond the outer stretchers (Fig. 14). Such mats will last for several years if kept dried and under cover when not in use. Special care should be taken not to roll them up for summer storing while they are damp.

If it is found convenient to make a frame, upon which the stretchers can be extended horizontally, the work may be still

more easily performed. An old bedstead would answer the purpose well. In this case the straw being at first placed on both hands, the operator, standing between the stretchers, works backward, and, as soon as there is room for it, the straw is laid immediately before him upon the finished portion of the mat. Care should be taken to lace uniformly, and only moderately tight, otherwise the mat will be rigid, as a too closely-knit sock is harsh.

Common bass mats, or loose straw, mulch, or salt hay, are often used for covering frames, &c., but the straw mats made as above directed are better and more convenient.

CHAPTER III.

Implements of common Culture from Plow to Dibber.

IMPLEMENTS OF COMMON CULTURE.

ANXIOUS to restrict the size of this book, the author would willingly have omitted descriptions of implements, &c., but it was perceived that such a course would leave it very incomplete. The advancement of civilization is strikingly marked by the improvements in instruments in aid of labor, whether physical or mental. I have, however, limited the number of implements figured, yet giving all that the most successful cultivator really needs. Those who desire to try more will find it easy to make large additions.

All implements, whether large or small, should be kept clean when not in use, the handles and other wood-work being oiled or painted once a year.

PLOWS.

Fig. 15.



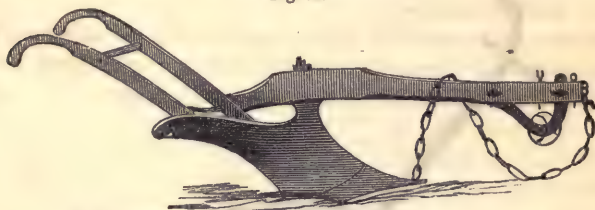
Common two-horse Plow.

There is no end to the nominal varieties of plows, but Fig. 15, intended to represent the old - fashioned "2½ D" of Wood, who was the original

patentee of plows made with pieced castings, which is a favorite with the farmers along the Hudson, is a fair specimen of the most useful and handy plow for common purposes, to be worked in all soils with a single pair of oxen or horses, with or without the forward gauge-wheel and coulter.

Fig. 16 is a longer-fashioned and more wedge-like plow,

Fig. 16.

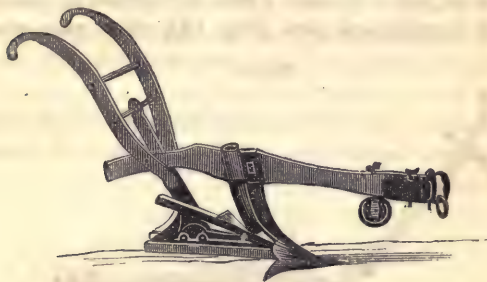


Longer-fashioned two-horse Plow.

often preferred for land that is smooth and free from stones, as upon our Western prairies; but the shorter the gearing of the plow, the closer will it run to the ends, and be turned and otherwise managed the more easily.

The subsoiler (Fig. 17) is simply a heavy, strongly-made

Fig. 17.



Subsoiler.

plow-frame and share, without mouldboard, calculated for following in the wake of the common plow to loosen thoroughly the deeper soil.

Small plows should never be made with double handles; why they ever were so made I am at a loss to divine, unless in

mere imitation of the larger plows, which require them. In small plows, the second handle is a useless and very inconvenient encumbrance; but at the Fair of the American Institute for 1857 not a single-handled plow was exhibited.

The small one-horse plow (Fig. 18) should be of the same general fashion as Fig. 15, but with a single and rather more upright

Fig. 18.

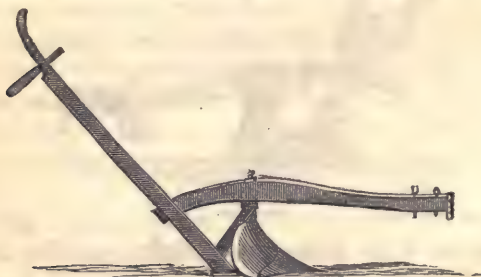


Small one-horse Plow.

handle, from which a brace extends to the outer extremity of the mouldboard. It may often be used in the second plowing of patches in the garden, where a larger plow and double team could not work, but it is chiefly used for furrowing and hilling.

The half mouldboard plow (Fig. 19), when properly made,

Fig. 19.



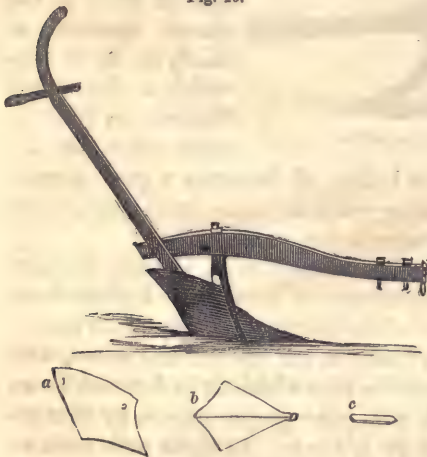
Half mouldboard Plow.

is a rather narrower and fuller-breasted, but lighter plow than Fig. 18, of the same general style, but with the hinder end or

wing of the mouldboard left off, so that it is calculated for stirring the earth without turning the furrow-slice over. It may therefore be driven deeply between growing crops without risk of covering them, though it suffices in general to form hills of the most desirable kind. *See HILLING.* It is often called the "Potato Plow," from its very common use in that crop.

The best double mouldboard plow (Fig. 20) is a small single-

Fig. 20.



Double mouldboard Plow.

handled plow, with two movable mouldboards (a), the fore edges of which fit into grooves in the standard, and are kept firmly in place by a wooden wedge at the beam, each being braced outward by a small wooden pin (c) near the heel. The share is of a triangular or duck-bill form (b), fitting on to the point of the sole, and secured to it by a wedge on its under

side. It is used for hilling potatoes, &c., after the earth has been first plowed from them.

In light, clear soils it may be useful, but in ordinary land must be run shallow and scooping, and works unsteadily, and on various accounts can seldom be made to save labor without corresponding loss to the crop. Larger and stronger ones are made, which, except possibly for ridging, are still less valuable.

The skeleton plow (Fig. 21) is, in fact, a small subsoiler, made by taking off the double mouldboards from Fig. 20. It closely resembles the old Roman plow, without its wings or triangular followers. This plow is invaluable in the operations of the farm gardener, particularly for giving the last deep movement to the earth between the rows of growing vegeta-

Fig. 21.



Skeleton Plow and Horse Driller.

bles, such as cabbages, carrots, beets, &c. It may also be used for ordinary furrowing by fastening an old shoe or something equivalent in front of the curved standard or shaft, so as to give width to the opened furrow; or, if it be used with an old

share having the corners broken off, it serves a good purpose as a horse-driller in making drills for wide-rowed crops, where a proper drill or corn-planter is not used.

This and the half mouldboard plow (Fig. 19) are the most marked and valuable improvements among the lighter forms which have been adopted since patent plows came into use.

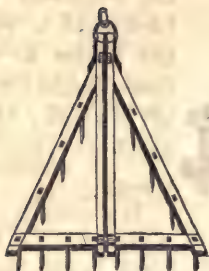
A small hand-plow is found in our agricultural stores, with a long, straight, stout handle, into which it is fastened by an iron shank, upon which the plow proper moves, so that its depth may be regulated by a screw. In light soils such an implement may often be found useful in garden culture. Its present construction, however, is ridiculously wrong, since it is made to draw as a common hoe, requiring the workman to walk backward as he labors, making its use a task for a convict rather than a pleasant labor for the amateur.

Any country blacksmith can set the shank the other way in a few minutes, and when thus changed to thrust instead of draw, and gauged to a proper depth, the workman, by throwing his weight a little forward upon the handle, and moving steadily, will be able to make it perform satisfactorily without much waste of muscle.

HARROWS.

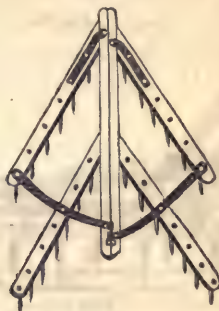
The harrow, whether triangular or square, is commonly made without being jointed or hinged for folding; but the improve-

Fig. 22.



Triangular folding Harrow, single.

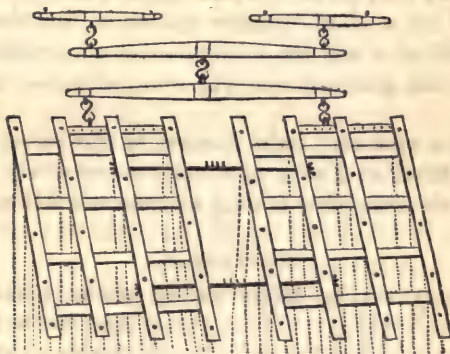
Fig. 23.



Triangular folding Harrow, double.

ment is so obviously valuable on various accounts, that it should be universally adopted. The square or oblong harrow, made with three bars in each leaf, will be found more convenient to carry on an ordinary stone-boat or sled than if larger.

Fig. 24.



Square or oblong folding Harrow, with either six or eight bars.

The drill harrow (Fig. 25) is a small triangular harrow, about four feet in length, made with clamp hinges in front, and movable rack or gauge-bars near the back, by means of which it may be spread in width to thirty inches, or closed to about sixteen, at pleasure.

It has a single handle set into the centre-bar, just back of

the gauge-bars, which is braced securely from near the outer

Fig. 25.



Drill Harrow.

end of the bar, having sufficient slope backward to enable the holder to walk freely behind it, and lift it readily by the hand-pin when necessary.

It is usually made with two or three teeth in the centre-

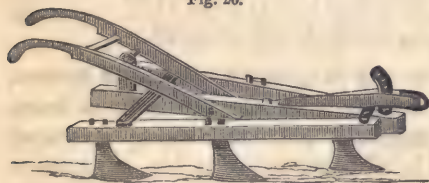
bar, and four in each of the wing bars. Sometimes a short beam is attached, as in the cultivator, rising ten inches or a foot above the bar, so that, if desired, the power may be increased by the pressure of the draft in front and the hand of the holder behind; or, instead of the beam, a well-braced iron rack-bar may be used, upon which a loose link is raised or lowered by a short wooden pin, as in the above figure (25), or both this and the cultivator may have the semicircular rack and gauge-wheel (Fig. 26 *a*) attached to the centre-bar.

A smaller and very light harrow of the same construction, with teeth of $\frac{3}{8}$ or $\frac{1}{2}$ inch iron, is especially useful to follow the skeleton plow among root crops while young.

CULTIVATOR.

The cultivator (Fig. 26) is framed precisely like the drill

Fig. 26.



Cultivator.

harrow, but with a double handle, and each tooth has a small double-mould share attached, or the entire tooth is cast in one piece, with double-mould share

points; it is by some called a "Horse Hoe," and by others the Hoe Harrow.

Sometimes the two outer back teeth have only single-mould shares, which, by changing from side to side, may be set so as to turn their little furrows either to or from the rows between which they may be running. The beam may be dispensed with if the rack and gauge-wheel described below is preferred.

The cultivator is a mere surface implement, and unless, possibly, in very light soils, will not save much labor, except at cost of crop. The single-horse plow, or the half mould-board, followed by the drill harrow, does greatly superior work.

The semicircular rack, &c. (Fig. 26 *a*) consists of two per-

Fig. 26 *a*.



Cast-iron semicircular
Rack and Gauge-wheel.

forated and matched cast-iron bands, with brace-bands across the diameter. The brace-bands have at the forward end projecting sockets, in which the arms of the gauge-wheel axle work. They have also a single hole at the centre, by which they

are secured to the bar with a bolt that forms the axle of the rack. Upon this it is moved at pleasure, and set to the desired depth by means of a loose pin or bolt passed through the rack-holes above or below the bar; the draught is by a movable link, which can be fixed at any point in the semicircle.

The rack is made to suit a bar of about four inches width, and can be fitted in a few minutes to any harrow or cultivator having its centre-bar of sufficient length beyond the hinges.

SEED-SOWERS.

The corn-planter, Fig. 27, p. 46, is a skeleton plow, with a hopper, sowing-tube, and covering apparatus attached, connected with a contrivance which, by a spring, or circular brush, or otherwise, passes the requisite amount of seed from the hopper into the tube for planting, at the proper distances. There are several good ones patented; the figure represents Emery's.

The hand seed-sower, or "barrow drill," Fig. 28, p. 46, is a smaller machine, but of the same general description as the corn-planter. In well prepared soil it makes the drill, sows

the seed, either continuously or at given distances, covers, and gently presses it. Sometimes the arrangement for covering is

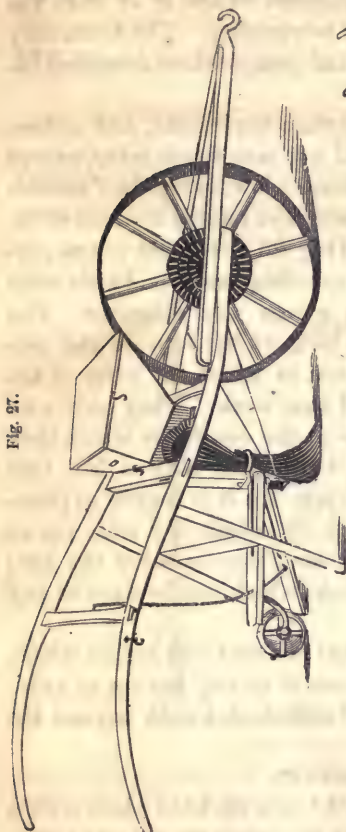


Fig. 27.

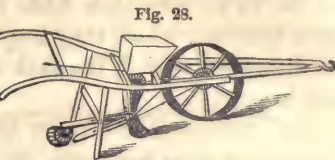


Fig. 28.

Hand seed-sower.

such as to throw the small lumps first upon the seed rather than the finer soil. This is undesirable, and should be obviated by gearing a small spring-governed rake after the coverer, or by some other device.

Corn-planter.

The sowing-tube, Fig. 29, is a tin tube, about four feet long and an inch in diameter, with a small bend or lip at the lower end, and at the upper a funnel mouth. The sower, holding the tube in his left hand, draws its lower end after him in a previously-prepared drill, dropping the seed as he goes, in due proportion, into the funnel, whence it passes to the prepared drill, being after-

ward covered by raking. It is suited to the mere amateur, or one who is rheumatic.

Fig. 29.



Sowing-tube.

PICKAXE, STUB-HOE, &c.

The crowbar, Fig. 30, is too well known, with its uses, to require description. To be handy for its various common purposes, it should be about five feet long, weighing at the most

Fig. 30.



Crowbar.

twenty pounds, rounded and tapering toward the top, squared and heavier toward its steel-tipped point; or the whole may be a little lighter, and entirely of cast steel.

Fig. 31.



Pickaxe.

Fig. 32.



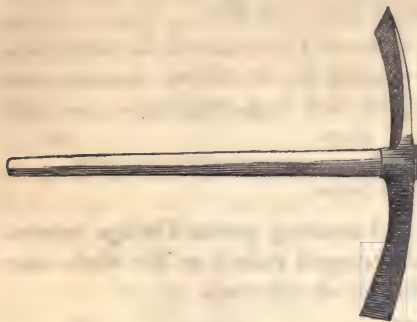
Stub-hoe.

The pickaxe, Fig. 31, should have its two steel-pointed arms of equal length, weight, and curve; its eye oval, strong, larger outward than inward, and rather heavy in proportion to the arms, to add force to the stroke, but for common purposes the whole should not weigh more than ten pounds; with an ash or hickory handle, about three feet long, perfectly fitting the eye.

The stub-hoe, Fig. 32, is simply a strong, rough adze, not quite so much incurved as that used by shipwrights, and serves well for cutting up by the roots bushes that are found too strong for the plow.

The mattock, Fig. 33, is a combination of the stub-hoe with

Fig. 33.

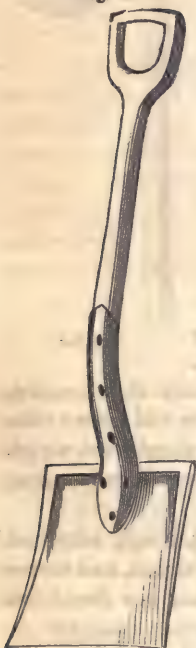


Mattock.

a rough root-axe, intended for the same general purposes as the former; but, as commonly made, with its blades too long and awkward, it is a clumsy tool, to which the stub-hoe, aided, if needful, by a common axe, is greatly preferable.

SHOVELS AND SPADE.

Fig. 34.



Stable-shovel.

Fig. 35.



Garden-shovel.

Fig. 36.



Scoop-shovel.

Fig. 37.



Spade.

The shape of shovels differs with the purposes for which they are intended. Some, for special uses, are large and scoop-like, as Fig. 34; others more moderate in size, and fashioned less with a view

to carrying their load than to facility in its discharge, as Fig. 35. Such are our canal and rail-road shovels, which, being also of sufficient capacity, serve well for the varied purposes of the garden. Perhaps the best size for common use is that known as No. 2, of Ames's manufacture, with a handle about twenty-six inches long, including the eye, and a flattish, bright steel blade, cropped at the corners to aid its balance and general efficiency in excavating, its blade inclined slightly inward or upward by the shortening of the front strap and the bend of the handle.

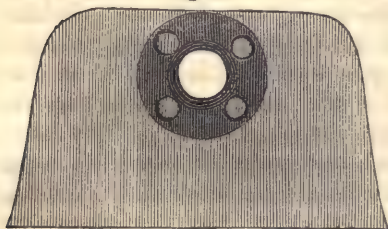
Long-handled shovels and spades occasionally serve a purpose, as in removing matter which it is unpleasant to approach; but, except as prys, there is a great loss of power in using them, and in general they are suited only to the lame or the lazy.

The sheet-iron scoop-shovel, Fig. 36, is every where known as an instrument perfectly adapted to its ordinary uses.

The spade, Fig. 37, should be of stout and polished steel, generally of the size known as No. 2, of which the blade is usually twelve inches long, running from seven and a half inches wide at the insertion of the handle to seven inches at the edge, strengthened by a very slight curvature, and having strong bands laid up a sound ashen handle, properly curved to give a forward set to the blade. The ordinary length of the handle should be twenty-six inches, including the eye; but this may vary a little to advantage for persons of different height and flexibility.

HOES.

Fig. 38.

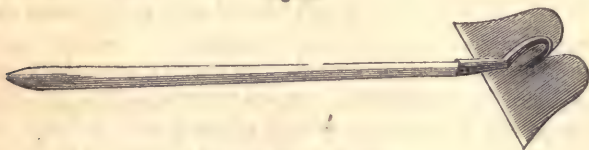


Steel-blade Hilling-hoe.

The hilling-hoe, Fig. 38, is a thin, flat plate of steel, perforated, and having its eye or socket formed by inserting a solid band of pretty stout sheet iron, the outer rim of which is turned down upon the back of the blade, and riveted to it,

as shown in the figure. The smaller end of this slightly-tapering eye-band stands inward, with a very slight inclination toward the edge, or downward, to give set to the blade. This hoe has almost no capacity for ordinary work, where force upon the edge is required. Its advantages are that it may be prepared for use in a moment by slipping it downward to the butt of a tapering handle, or smoothly-dressed light bean-pole, and that its peculiar lightness, size, &c., enables an ambidextrous workman to hill more rapidly than with any other hoe in all loose soils tolerably free from stones. Inferior iron-bladed hoes of this description are worthless.

Fig. 39.



Goose-necked steel Garden-hoe.

The goose-necked steel garden-hoe, Fig. 39, long and extensively known as Tuttle's patent, is probably perfect for its purposes, no essential change having been found desirable in its material or form from the first, though of late attempts have been made to improve it as a hilling-hoe by welding the goose-bill more nearly upon the back edge of the blade, and lessening the curve; but it loses value as a garden-hoe by the change. In its original and proper shape, it has a forged and polished steel blade, slightly incurved, welded to an iron goose-necked shank, which is firmly keyed into a rather light handle about four feet long, the tapered end of which is sheathed and secured by a sufficient iron ferule. The blade is lessened a little in width from the edge backward, and by beating out portions of the back part of the blade toward the ends, two wings are formed, rising slightly above the neck of the shank, between which, thus spread, the goose-bill is welded to the blade, being set in a little toward its centre. By this arrangement the direction of the force in using it is so balanced that, whether the stroke be made with the centre or corner of

Fig. 40.



Goose-necked crane's-bill Hoe, or Weeding-hoe.

the edge, there is about equal power, and no "wring" upon the hand of the workman.

The goose-necked crane's-bill hoe, Fig. 40, is a light, long, tapering hoe, with a socket for the handle, which may sometimes be found useful for loosening the earth among flowers, or when taking out strong weeds, or around young vegetable plants after beating rains.

The thrust-hoe (Fig. 41 *a*) is a thin steel blade, about two inches deep and of any desired width, welded or riveted to a nearly semicircular frame attached to a socket, into which a pretty long and stout handle is inserted, and the hoe is thrust instead of being drawn in the various uses to which it is put.

Fig. 41.

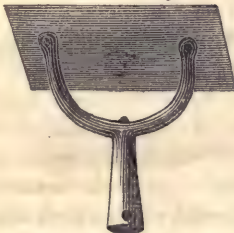
a*a.* Common Thrust Hoe.*b.* Improved Thrust Hoe.

Fig. 42.



Missionary Hoe.

Fig. 41 *b* is a somewhat improved form, in which the socket and frame are

of malleable iron, and the ends of the frame, or arms, are riveted near the middle of the blade, which should be about three inches wide, and so set that it can be used either in thrusting or drawing.

Hoes of this kind are calculated for shallow hoeing upon a level surface, as among very young vegetable or other crops, or for cleaning paths, &c. Their proper management requires some experience, and their width should not exceed eight inches, which is exactly enough to pass safely between rows that were sown a foot apart. Any larger size than this becomes unwieldy even for a strong man.

The missionary hoe (Fig. 42) is simply the thrust hoe with a square frame, and a wooden roller geared ahead of the blade for the purpose of "breaking the crust" among young seedling crops.

It also gauges the cut of the hoe to a uniform depth, thus rendering it an excellent path hoe. In soils clear of stones it will do a great deal more work in the same time than either the common garden hoe or the thrust hoe. In fact, if the soil be clear and light, an experienced hand will pass it through foot-rows of young plants, cleaning them thoroughly, at a rate very little slower than an ordinary walk.

However naturally the special object of this humble instrument might have suggested its name, it was not, in fact, so derived; but the hoe itself was invented by a missionary connected with a company sent to the Osages of Arkansas Territory by the American Board nearly forty years ago.

TROWELS AND TRANSPLANTER.

GARDEN TROWELS.

Garden trowels (Figures 43 *a*, *b*) are tapering, half round

Fig. 43.



a. Smaller Garden Trowel.



b. Larger Garden Trowel.

Fig. 44.



Flower Transplanter.

trowels, of different sizes, which are used where special care is required in removing small plants. The blades should always be of polished steel, and ought not to be suffered to become rusty.

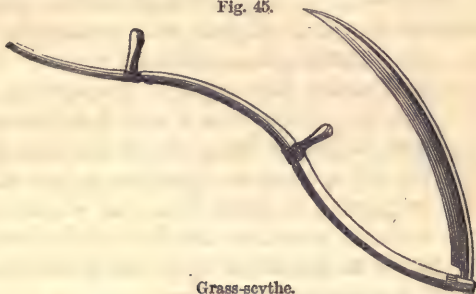
The flower transplanter (Fig. 44) may be regarded as a pair of trowels loosely hinged together at the edges by a single rivet, so that when thrust down, one on either side of a plant, their points can be braced together, and the whole root and earth be lifted and transferred to a new and previously prepared hole or pot. The same end may be accomplished with a pair

of loose trowels and an iron ring of suitable size, which, being passed over the head of the plant, and the trowels thrust perpendicularly down within it, will afford the necessary fulcrum to each when strained upon.

GRASS AND BUSH SCYTHES, &c.

The scythe (Fig. 45), not being intended for ordinary mowing, but for cutting grass while short upon lawns, and plots,

Fig. 45.



Grass-scythe.

and paths, if such are made, and in odd corners, ought to have, as represented in the figure, a pretty short blade, with a "sneath" so bent as to lay the edge almost perfectly level with the surface; and instead of the old-fashioned wedged "knebs" and "heel-ring," let it be fitted with the screw knebs and the screw or clamp heel-ring of Lamson's patent, or some other equally convenient and stanch.

Fig. 46.



Bush-scythe.

The bush-scythe (Fig. 46), which is often found useful for cutting coarse weeds, has a very short blade, strongly, even rather heavily made, and should have a short strong sneath, not much bent, and hung with extra strong clamp heel-ring, or with the heel-ring doubled.

Fig. 47.

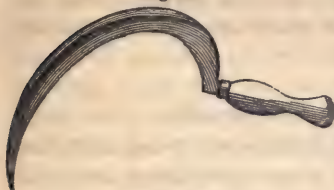


Bush-hook.

The bush-hook (Fig. 47) is a powerful instrument for cutting brush at arms' length, but is less efficient than the bush-scythe, which will generally supersede it.

The grass-hook (Fig. 48) resembles the old sickle, or reaping-hook, except in being somewhat shorter, and having a plain instead of a toothed edge. It is used for cutting the grass from edgings or other limited spaces where the scythe can not be worked.

Fig. 48.



Grass-hook.

The grass-edger (Fig. 49) is a strong, crescent-formed steel plate, with a socket for the handle extending from its inner centre. It is used for cutting the edges of grass-paths, plots, or edgings, either with a stretched line or by the eye, the handle being of sufficient length to enable the operator to throw his weight on to it as he presses it before him. A slight change is sometimes made in the form of the knife, and a small wheel geared to run ahead of it, which has the advantages of giving it gauge and steadiness.

Fig. 49.



Grass-edger.

FORKS.

All pronged and toothed implements for working in the earth,

Fig. 50.

Fig. 51.

Fig. 52.



Spade-fork.



Manure-fork.



Hand-fork.

&c., should have their prongs or teeth of steel, and neither round nor flat, but either oval or four-sided, the thickness or depth of the prong or tooth being made greater than its width, so that its greatest strength may always be opposed to the greatest strain.

This is of special importance in the implements figured above and in the potato-hook. In rakes it is desirable, though not essential.

The spade-fork (Fig. 50) is simply a strongly-made, square-headed, four-pronged steel fork, of which the prongs should be about ten inches long, from one half to

three eighths of an inch wide, and full half an inch deep or thick, standing almost perfectly straight, tapering but very slightly, if at all, and being dubbed off rather than pointed. It should have a heavy shank, secured by a strong ferule and riveted straps into the handle, and so bent as to give the prongs a little set forward. The whole should be of the length of an ordinary spade, or a little longer—say rather more than three and a half feet. It is used to great advantage in the fall or spring for stirring and cleaning the ground around and among herbaceous plants and shrubs, and for the proper spring cleaning and loosening of asparagus, strawberry-beds, &c.; and, in general, for all light digging, whether deep or shallow.

The manure-fork (Fig. 51) should be of steel, with prongs of the same general form, square-headed or semicircular, rather wider than the spade-fork, but lighter, keenly tapered, well curved, and polished. It may either be braced with strong bands to the handle, or, if the additional strength be less desirable than lightness, it may be simply keyed into the handle through a strong end-band or ferule, extending about the same length upon the handle as the shank or tang within it. It is used for moving manure, weeds, rubbish, &c., and is often found convenient in heaping hay.

The hand-fork (Fig. 52) is a miniature spade-fork, with a handle twelve or fifteen inches long, useful for the light work of ladies in flower-plots and borders.

POTATO-HOOK.

Fig. 53.



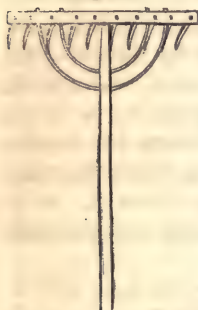
The potato-hook (Fig. 53) is a steel hook, which should be strongly made, with four prongs shaped like those of the spade-fork, but proportionably smaller, set well forward, and very slightly curved, having a pretty stout shank securely keyed into a strongly-feruled ordinary hoe-handle. In general the prongs are made of other forms, and often give trouble, and the mode of securing them in the handle is not yet perfected by

the manufacturers ; in heavy work they are apt to become loose. Besides their common use as potato-diggers, they are also valuable for loosening the earth among young crops, around plants, and in narrow borders where it is desirable to avoid treading upon the newly-loosened soil ; for removing grass that has become sodded among edging or near the roots of plants ; also for "chopping over" ground that has become dry, before sowing it ; for covering seeds sown in drills, and for many of the general purposes of a small rake.

RAKES.

The wood-headed rake (Figures 54, 55) is a familiar garden tool. The head of a rake is

Fig. 54.



Larger wood-headed Rake.

Fig. 55.



Smaller wood-headed Rake.

the bar, into which the teeth are fastened, or to which they are attached. When this is of wood, the end of the handle is tapered and inserted at the centre of the bar, having two or more side-braces of tough wood or pretty strong wire. They have eight, or ten, or twelve teeth, at about an inch apart, which are either clinched, or, more neatly, riveted in with small burrs. Such rakes are to be found, of excellent make, in almost every country store, their single general defect being that the handles are from six inches to a foot too short. It is not force, but reach, that is required in a rake ; and the handle of a garden-rake should be but little, if any, shorter than that of the ordinary hay-rake.

Fig. 56.



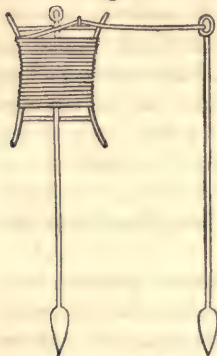
Cast-steel Rake, with shank.

Cast-steel rakes of various sizes (Fig. 56), with heads to which the teeth are welded, *not riveted*, having either shank or socket for the handle, though, in general, the former is preferable, are also found in company with the former, the handles having the same defect ; but in other respects they are all that can be desired, except where, for special reasons, the wood head may be preferred.

MISCELLANEOUS IMPLEMENTS, &c.

The line-reel and its pin may be of iron, as shown in the figure (57), or a couple of wooden pins, of an inch diameter and fifteen inches length, may be substituted, upon each of which one half the line may be wound, as boys wind kite-cord.

Fig. 57.

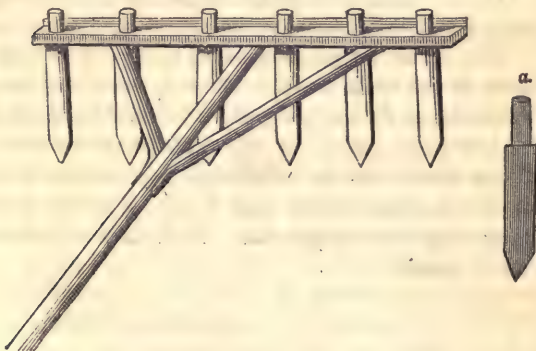


Line and Line-reel.

The line itself should be of tarred cord, twisted pretty hard, such as ship-chandlers and boatmen call "marlin," a hundred yards' length of which will not cost above a dollar, and with care will last for twenty years. Paths, beds, plots, &c., are laid out by the aid of the garden-line. It is also used as a guide in setting out rows of plants, or in the preparation of drills for sowing, which are usually cut along it with the hoe, or merely marked along with the end of the handle, or with a stick.

The marker (Fig. 58) is a home-made implement, devised

Fig. 58.



Marker.

to obviate the necessity of repeatedly setting a line, and drawing single drills by it. To make it, take a piece of any com-

mon joist that is not too light, five feet and a half long, and with an inch and a half auger bore six holes through it at a foot apart, leaving three inches solid on each end. Insert the handle, five or six feet long, in the centre, almost horizontally, and brace it well. Next take six pieces of common pointed picket, about eighteen inches long; shoulder them uniformly on both edges at a foot from the point end, forming a shank to each of six inches long, dressed so as to pass the auger holes (Fig. 58 *a*). Having set them all in, nail a light strip along the upper and under sides of the bar, back of the teeth, to set them in proper range and keep them from turning, and finish by wedging them carefully and firmly to their places from the upper side.

Where a large piece or bed is to be sown or planted, it is used in the following manner: The line, being tightly stretched in the desired direction upon one side, forms a guide to the outer tooth of the marker in the first draft; subsequently the outer mark of each draft forms the guide, the tooth being run in it at each repetition of the stroke, as the operator, walking backward, draws the marker carefully after him. With this, six marks are made at the first draft, and five at each repetition.



Dibber. small plants.

Lighter or heavier ones, with narrower or wider spaces, can of course be made.

The dibber or planting-stick (Fig. 59) is best made from an old spade-handle, which is usually of the proper thickness for the purpose. It should be about fifteen inches long, including the hand-hold or eye. The point should not be shod with iron, nor sharpened as if for piercing, but formed rather obtusely, as nearly of an egg form as possible. It is used in setting out

CHAPTER IV.

Sources of Vegetation.—Elements of Vegetable and Animal Life.—Manuring and Manures, Composts, etc.

SOURCES OF VEGETATION.

As all plants sprang originally from the earth, were watered by the rain, and surrounded by the air, we may properly expect to find in these, or some of them, all the elements of which plants consist; and such Chemistry shows us is the fact. Plants receive from continually renewed, and therefore exhaustless sources in the earth and air, through the water which dissolves or absorbs them, those elements which each variety of plant secretes and appropriates according to its particular nature and wants, aided or modified by the influence of light and heat. These same elements, the constituents of vegetables, form also, with certain peculiar modifications, the complete circle of the elements of animal life. Milk is the only perfect and entire compound of the essential elements of animal support and growth; but those elements already existed in the grasses from which the milk was secreted, and are derived even still more richly from certain other vegetables and grains, receiving from them in the process of secretion their own peculiar taste or odor, or that of other things mixed with them, as the wild onion, etc. "All flesh is grass" in something more than a merely figurative or poetical sense.

Animal digestion and partial decomposition by fermentation are the common means by which the various elements, originally derived from their natural sources through the action of the vegetable world, are prepared to be returned to it, that they may be gathered in new forms, to be again consumed, and again returned; and again regathered, in the incessant circle of changes which shall end only with time.

MANURING AND MANURES.

Manuring, then, is to furnish to the plant, in a fit state and under suitable conditions, those elements which are essential to its healthful growth; in other words, to feed it, accompanied with such stimulants as will induce more vigorous action in the appropriation or assimilation of the food we offer. Sometimes, indeed, we modify the form, or withhold the stimulants, having rather in view permanent than immediate benefit, as when we apply alone crushed bones, lime, unrotted manure, muck, etc., all of which we use with more or less calculation of benefit to future crops, or to the composition of the substance of the soil. There is, however, much yet to be learned as to the precise modes of operation of divers manures, and the peculiar secretions of different vegetables. As an illustration, we may instance the fact that white bush-beans, which contain some sixty or more per cent. of largely nitrogenous nutriment, are so commonly raised upon poor land that it has become proverbial to say of soil absolutely impoverished, it is "too poor to raise white beans."

CLASSES OF MANURES.

Manures are sometimes conveniently classified as, 1st. Animal manures. These are either decaying animal matter, fish, etc., or they are certain natural or prepared manures, in which, with the other ingredients, animal matter, or the product of its putrefaction, in the form of ammonia, fixed or free, may to some extent abound, as ta-feu, guano, poudrette, etc.

They are regarded as powerful stimulants to vegetation.

2d. Vegetable manures. These are stable and barn-yard manures, green crops, swamp-muck, etc., in all of which vegetable matter predominates, though they are neither destitute of animal matter nor free from admixture of earthy matter and salts. They are especially calculated to favor and promote the growth of vegetables as distinguished from seeds or grain.

3d. Earthy or saline, sometimes called specific manures, because containing only one, or, at most, a few of the necessary elements of vegetable growth. These are lime, gypsum, or sul-

phate of lime, ashes, etc., in which earths and salts are almost exclusively present; and with these may be reckoned charcoal (including coal-cinders or coke), though perhaps, chemically considered, it does not class with them, its chief value being supposed to consist in its capacity to absorb or "fix" ammonia.

These, with those of the first class, are regarded as peculiarly useful in the production of the seed or grain.

Another classification sometimes adopted, which has some special importance in garden culture, is that which rates manures according to their power of absorbing moisture. Those which are highly absorbent, as the manure of hogs, oxen, cows, etc., are called cooling; and those which are less, or very slightly so, as horse manure, are called heating. Of those classed above as earthy or saline manures, gypsum and charcoal are the most powerful absorbents, and these are also distinguished by their capacity to fix ammonia. Perhaps we may conclude that their power in the one case is a gauge or indicator of their value in the other.

MANURES SUITED TO VARIOUS SOILS.

Manures, particularly for the garden, should be carefully adapted to the soils they are intended to enrich. If the soil be sandy and hot, especially if it be sand lying upon gravel, the cold and moist manures above named are greatly to be preferred, and stable manure should be entirely decomposed, and reduced almost to the state of vegetable mould before it is applied. The applications of manure to such soil should be frequent rather than heavy; and ash compost and liquid manure applied to growing crops through the season will be found of especial benefit.

On loamy soils there is a wider range for choice. All kinds of manure will be found suitable, their application being regulated by the necessities of the particular crop or season.

On cold soils, as strong loam or clay, stable manure and city street-manure should be almost exclusively used, with dressings of ashes, guano, etc., and, if possible, the soil should be mechanically improved by the frequent addition of sand or road-wash. See page 18.

APPLICATION OF MANURES.

As a general rule, barn-yard manure, including that from the stable, will be found suitable for all garden purposes. If well rotted, it may be applied unmixed to the soil; or it may be formed into compost, for doing which directions will be found under the appropriate head, p. 63. If applied in an uncomposted but half-rotted state, it should be laid on the garden at the rate of from forty to a hundred loads to the acre, at the earliest possible moment after spring opens, and must be immediately dug or plowed in. The subsequent preparation of the ground for the reception of crops will mix it sufficiently with the soil. If compost be used, it may be in smaller or still larger quantity per acre, and may be applied to the land as the crops are about to be put in, being then carefully and thoroughly mixed with the soil in the process of its preparation for the seeds or plants intended to occupy it.

Animal matter, with "ta-feu," guano, hen manure, poudrette, lime, ashes, and the other earthy and saline manures, possess the very great advantage for garden use of being free from weed-seeds, and on this account are desirable as far as they can properly be made available; but it must not be imagined that they can permanently become substitutes for ordinary manure.

Guano and hen manure that has been kept dry are safest when used in compost or as liquid manure. They may also be sown broadcast upon a fresh, rough surface, and chopped, raked, or harrowed in.

Bone-dust, lime, leached ashes, home-made or from the soap-makers, may be used freely—say from twenty to sixty bushels to the acre—either lightly plowed in, or sown upon the rough, freshly-plowed surface, and mixed in by a thorough harrowing.

Unleached ashes may be used in the same manner at half the rate per acre, or applied as ash compost. See p. 64.

Ta-feu and poudrette, the former being about double the strength of the latter, should be sown broadcast, and well mixed with the soil in the final harrowing or raking previous to sowing or setting out; or they may be mixed in hills prepared for sowing or setting plants, one or two good handfuls to a hill;

or they may be safely sown in drills, with or upon the seed, at the rate of one light handful of the former or two such handfuls of the latter per foot.

When sown broadcast, ta-feu may be used at a rate varying from one to five barrels, and poudrette from ten to forty barrels per acre. They prove efficient aids to almost every variety of vegetable crop; but they are by no means so useful if their application be deferred until the crop is growing, unless when mixed in hills prepared for setting out, though the disadvantage may be partially overcome by carefully mixing and covering them in the earth around the young plants.

MANURE HEAP.

Every homestead, however small, should have upon it a corner or hollow where refuse matters of all kinds may be thrown together as they accumulate, upon which slops may be thrown, and ashes sifted, &c., &c. In the course of the year a pretty large heap of valuable manure, or, rather, compost, will be prepared, which should be occasionally turned and mixed with good earth.

GARDEN COMPOSTS.

Ordinary compost for garden use may be made by mixing the manure of spent hot beds with equal quantities of fresh barnyard or stable manure and swamp muck, or sods pared from alongside fences, or from any spot where water often settles. To these add air-slaked lime equal to one twentieth of the whole bulk, and an equal quantity of unleached ashes, or double this quantity of leached, and throw in and cover any decaying animal matter or drainage of the slaughter-house. Watch the heap, keeping a stick thrust into its centre to serve as a thermometer. Whenever, on withdrawing the stick, you find it getting hot, turn the heap over, and inside out; reinsert the stick, turning the whole again when the heat begins to rise, and at each time, after turning, sow plaster (gypsum) pretty thickly over it. In a few weeks, if the weather be moderate or warm, it will be ready for use.

It is proper to observe that lime should be mixed with stable

or barn-yard manure while it is yet cool, and not after fermentation has made much progress, or while the process is going on, otherwise it drives off instead of preserving the ammonia.

ASH COMPOST.

Ash compost may be made with equal parts of unleached ashes and gypsum, carefully mixed or sifted together. The mixture should be kept dry, and applied to crops for which it is suitable before rain, either full-handed, broadcast, or a good handful to each hill spread over it.

GUANO COMPOST, &c.

Guano or unleached hen manure, mixed with one half the bulk of ground gypsum and four or five times the bulk of light, rich loam, the whole being thoroughly mixed and sifted together, and allowed to lie for a few weeks in a dry place, being turned once or twice in that time, will become thoroughly incorporated, and may be applied, even by inexperienced hands, without the risk which often attends their use in an unmixed state. When applied, this compost should be covered, and not merely spread upon the hill like ash compost.

For top-dressing grain, for grass, or fruit-trees, guano should always be well sifted and powdered, and mixed with at least so much common earth as may serve to keep down its unpleasant dust in sowing, as well as to prevent loss by wind. In this state it may be used at the rate of two, three, or four hundred pounds to the acre.

For flower composts, see directions under that head, p. 443.

LIQUID MANURE.

Ordinary liquid manure is the drainage of the stable or the barn-yard, preserved in a tank or pond-hole, and applied by means of a sprinkling-cart or watering-pot. Of the drainage from the stable, each forty gallons may be reckoned worth as much as an ordinary carman's load of manure. The value of barn-yard drainings is very variable, depending on the form and soil of the yard bottom, amount of exposure, and quantity of rain.

For special uses, it has long been a practice in "the rural districts" to prepare liquid manure artificially by putting water upon hen manure or other material in a barrel, stirring it once in a while, and using it when it has settled for various crops, particularly onions, for the raising of which in a superior manner it has had for fifty years a sort of farmers' patent. It may, however, be made useful to almost all crops, particularly upon poor land, and where light manuring has been unavoidable. In a tank, such as that described p. 33, it is easy to prepare it in quantity by adding as may be found necessary manure from the hen-roost, or poudrette, or guano, either of which, or a mixture of them, may be used in the proportion of about one barrel of either of the two former or twenty pounds of the latter to a hundred gallons of water. On each occasion for its use, after the quantity required has been taken out, it should be thoroughly stirred, adding water or manure, if necessary.

It may be made in a barrel at discretion, with one pound of guano, or ta'-feu, to from three to five gallons of water, or with a mixture of bone-dust and sheep manure, or with poudrette and hen manure, without special regard to proportions, but applying it carefully to the earth around the plant, and not to its foliage. With this view, whenever it is applied to growing crops, a watering-pot without the rose should be used; but in applying it to ground that is not sown, or in which the seed has not yet sprouted, the rose should be upon the watering-pot. The repeated and moderate use of it is better than an excessive supply at once, and evening will be found the best time for its application.

CHAPTER V.

Reproduction in wild and cultivated Plants.—Vitality of Seeds dependent on certain conditions.

REPRODUCTION.

No clearer statement can be made of the general objects of the vast vegetable growth covering and beautifying our earth than that furnished by the pen of inspiration, "He causeth grass to grow for the cattle, and herb for the service of man, that he may bring forth fruit out of the earth." But in relation to each separate species or variety of plant, an inherent tendency or disposition to reproduction is its special and most marked peculiarity, as if simple self-perpetuation and multiplication in its offspring were the sole ends of its existence, though it is also apparent that through this tendency or disposition the general and ultimate objects proposed are effectually and directly reached.

It is interesting also to observe that this tendency or disposition to reproduction is in general put forth freely only in a single channel; it may be by offshoots or by seeds, but commonly, if freely by seeds, then not largely by offshoots; and if by offshoots, whether naturally or as a result of cultivation, then not freely by seeds.

This latter result is not uniformly accompanied by a destruction or disappearance of those organs of the plant which are necessary to the production of seed, for a few seeds are often produced; but, if the expression may be allowed, it seems to arise from a change in the direction of the virile force.

Striking illustrations of this are found in those varieties of onion which are cultivated chiefly for their offsets, and in the giant seedless pie-plant; and among flowers, by the tiger lily (*lilium tigrinum*), in which, although the floral organs of reproduction are full and prominent, yet no seed is yielded by them, the plant being increased moderately by offshoots or dividings

of the old root, and largely by the production upon the stem, at the bases of the leaves, of minute but perfect bulbs, which at first appear like small black buds. These are gradually loosened from the stem, and in due time, by throwing out a single root, cant themselves over on one side, and are shaken out of their parent leaf-cup by the slightest wind. This dislodgment being effected, the second or companion-root is pushed forth to effect the self-planting of the young bulb.

This tendency to mere increase, in whatever way it may be manifested, is satisfied, as we ought carefully to observe, by the most scanty growth in the plant, and in the grain with the very thinnest coating of flesh, or even, as in most seeds, by the production of the mere germ with its skin covering.

But the meagre growth of the wild plant, and the scanty covering of the seed, however abundantly sufficient for the absolute necessities of simple reproduction, fail utterly to meet the demands which are made upon them for support and comfort by the increased and increasing millions of mankind.

To obviate this difficulty, the efforts of cultivation are directed to the increase of the growth of the plant, or the enlargement of the fleshy substance of the seed. This effort, in the various grain-bearing plants, has resulted generally in an increase both of the plant-growth and of the grain, without any special drawback; but in many garden-plants the improved growth of the vegetable is attained at the expense of a partial or total loss of the power of seed production.

Thus a large, finely-headed cabbage or lettuce, or an improved melon, or pumpkin, or cucumber, will be likely to yield a much scantier crop of seed than one which is inferior.

The same law holds among flowers. Almost all wild flowers are single, and these, as well as the inferior single flowers of cultivated varieties, seed freely; but from those fine double flowers which cultivation has produced, it is often very difficult to obtain seed at all, as is often experienced in the case of superior balsams, pinks, &c.

VITALITY OF SEEDS.

The vital principle of a seed resides in its germ, which is a

perfectly-formed but minute plant of its specific variety. It seems probable that under suitable conditions the vitality of most small seeds might be retained for an indefinite period, extending even to many centuries, as in the "mummy wheat," the seeds thrown up from far below the earth's surface, or those which, being largely diffused through the surface soil, vegetate where they had been unknown for ages, when opened to the sun's influence and supplied with appropriate stimulus, or when the long-flooded upland produces swamp plants.

The strength and continuance of this vital principle in seeds depends on a great variety of circumstances in their production and storing. Seeds imperfectly ripened or insufficiently dried, as is not unfrequently the case with imported European seeds and grains, even after they have passed through the process of a moderate kiln-drying, though they may be of fine, plump appearance, yet will not, in general, bear keeping. Seeds that have in any manner become damp and heated, or musty, are risky or worthless; or if kept in a very hot place in vessels or packages through which evaporation goes on freely, or continued in it so long that the heat itself induces a change in the chemical condition of the seed, they may lose the vital power. Tables professing to give the various ages to which different seeds may be kept are therefore of little value; but, assuming that seeds are well ripened and stored with ordinary care, most kinds may be safely sown at five, and many at ten years old.

As in trees checking the exuberance of growth induces disposition to fruitfulness, so it has come to be regarded as a general rule that plants, particularly of the more luxuriant kinds, if raised from seeds which have been kept a year or two, run less to mere plant growth, and are more productive in fruit or seed than those raised from new seeds. Upon this theory cucumber and melon seeds intended for planting in frames are carefully kept for many years by persons curious in such matters, and sometimes, when for any reason it is desired to use them prematurely, artificial drying is resorted to as an equivalent.

In most seeds, however, age seems only, or at least chiefly, to affect the length of the period required for their germina-

tion ; as, for illustration, turnip seed sown fresh from the pod in August may vegetate in forty-eight hours, while that which is two years old, sown at the same time, will require four or six days, or more. But peas two years old not only require longer time to vegetate ; they are also expected to grow with shorter vines, and yield an earlier and more abundant crop of seed.

CHAPTER VI.

Vegetable Forms, Importance of ; Original ; Improvements in.—Vegetables, Color of ; Deterioration of ; Stock or Character of.

VEGETABLE FORMS.

THE form of certain vegetables is of importance on various accounts. It affects the cost of production and the weight of crop. It sometimes indicates quality, and often settles at once the desirableness or undesirableness of a particular variety, either for the cook or the cultivator, or for both.

Excepting the small wild bulb from which the onion has been obtained, and not forgetting that the parsnep and carrot, in their wild state, are somewhat fleshy, we may assume that all swelling, fleshy rooting or heading vegetables originally threw downward a single hard, wiry root, as the burdock, or upward a single and almost naked stem, as the wild lettuce.

In all these, cultivation, working sometimes blindly, and at others with precalculation of results, has produced various striking changes. The leaf of the well-cultivated cabbage has become thick and marrowy, and it has acquired a habit of heading before throwing up its seed-stalk.

In the beet, turnip, etc., we find a habit of fleshy enlargement or swelling. So great is the change thus induced that, instead of a naked, hard root or stem, we have vegetable forms advancing from this by various gradations, until the root spreads itself horizontally to a thin, flat form. The change has, in fact, proceeded beyond this, and shown us forms, as in some varieties of the turnip, concave on one or both sides, of which latter the yellow Malta is an illustration. Figure 80 i, page 186.

But the form of any rooting or heading vegetable may, by neglect of proper treatment, reapproximate to the natural form of the plant in its uncultivated state, becoming branched and fibrous in its roots, as figures 80 *c, d*, page 186, or thin and wiry, as Fig. 76 *c*, p. 131, Fig. 78 *a*, p. 161, and in danger of losing character entirely as a fleshy vegetable, and running to a mere tap or brush root. The cabbage or lettuce, on the other hand, when its head assumes the form of a cone, is approximating to a loose, headless growth, like that of the kale, or the rape, or the wild lettuce.

For the purposes of this work, it may suffice to note the intermediate stages between the wild form and that which we have designated as the flat (Fig. 80 *h*, p. 186); and it will perhaps be convenient if, for the present, we assume this to be the maximum of the change which cultivation has effected.

The advantages of this form are that it matures quickly, scarcely ever fails to yield a crop, and, in root crops, is easily gathered, even after some other forms may have been frozen in; that it measures well, *i. e.*, seems to yield largely; and that, whether in the lot or in the market, it "shows for all it is worth." Its disadvantages are, that it really yields but lightly or moderately, and that it is "unprofitable" in the hands of our cooks. Some of them would peel it to semi-transparency.

The shape intermediate between the flat and the globe, the cheese form, as it is sometimes called, or, in the language of Geometry, the flattened spheroid (Fig. 80 *g*, p. 186), has about all the advantages we have enumerated for the flat, without any drawback upon them farther than that, in general, it may be expected to mature a little later.

The round or globe form (Fig. 80 *f*), it would seem, should be regarded as the standard of excellence, since it affords a larger amount of solid contents in proportion to its surface than any other; but, notwithstanding, this might be taken to imply that it would also yield largely; such is not generally the fact. Roots that take this form have almost always, too, a habit of underground growth, looking as if they were moulded by the equal pressure of the earth upon them, and this renders them comparatively difficult to gather, especially in frosty weather;

while a globe that grows above ground is seldom of first-rate quality. It is a good form, but not the standard.

Receding from the globe, we find the "heart" form, the lower portion of the globe elongated, and tapering to a strong, deep root, Fig. 80 *e*, p. 186. The heaviest croppers are mostly of this form; but its usually large top and coarse habit, together with the difficulty of gathering, in respect to which it is as bad or worse than the globe, render it undesirable.

The *egg* form is desirable as an improvement upon the heart-shaped in roots that have not yet been brought to better forms. In *ruta-baga* the obtuse egg form, Fig. 80 *b*, p. 186, is at present perhaps the best that is found in general cultivation, although occasionally very superior single roots are met with which are nearly globular in form, and without the habit of wholly burying themselves in the earth during growth.

There are uncouth or fancy forms, such, for instance, as Dale's hybrid, Fig. 80 *a*, p. 186, which, while they serve as a distinctive mark of certain kinds, have little or nothing else to recommend them above others. Originators of new varieties and others interested directly or indirectly are apt to favor such, and generally claim for them some peculiar merit; but the aim of the true cultivator should be to combine superiority of quality with excellence of form, and this experience has shown to be readily attainable.

In heading vegetables the same changes and varieties of form are found. The cabbage, and lettuce, &c., are either loose collections of leaves, or screw form, or conical, or heart-shaped, or globular, or cheese-shaped, or flat. Of these the heart-shaped for early, and the cheese form or the globular for winter cabbages, and among lettuces the screw and the globe forms, may be regarded as the best, and no plant of them which does not come near or up to this standard should be used in the production of seed.

COLOR OF VEGETABLES.

Although in rooting vegetables color as well as form may seem to be of secondary importance, yet the practical cultivator is aware that it is so commonly associated with certain quali-

ties or characteristics that he seldom or never omits it as an item in his estimate of the value of any given variety. Thus, if a carrot be of a light or lemon color, he infers that it lacks richness of flavor; if a beet be streaked with white, he concludes that, however valuable it may be for early use, on account of its free growth, it will prove strong, or, at best, wanting in sweetness when kept for winter use; and in respect to turnips, he is familiar with the fact that, other things being equal, the yellow varieties are uniformly richer and sweeter than the white.

DETERIORATION.

There is an ever-recurring tendency in improved seeding vegetables backward to their primitive condition as mere self-reproducers; and here, as in the matter of vegetable forms, the constant effort of the cultivator is required to counteract this tendency, with this difference, however, in the mere business view of it, that while it is almost always the interest of the cultivator to improve vegetable forms to the utmost, the diminished average product of seed from such improved varieties constitutes a standing and strong temptation to the mere seed-raiser to permit this natural deterioration to occur, quantity in the yield being generally the measure of his business profits.

This retrograde tendency may be suddenly stimulated and strengthened by various causes in the different kinds of vegetables. In peas, beans, and the various running vines, it often becomes apparent in a single season, when the seed is saved from the later portions of the crop, the earlier product having been eaten while comparatively rare, or sold before the market became glutted. Such seeds produce what may properly be termed new and debased varieties, "early peas" that are late and unprolific, or "six-week beans" that in sixteen weeks may possibly ripen a scattering and scanty crop.

A similar effect, though not always equal in degree, is produced when plants which, being properly biennial, ought to "bottom," as the turnip, or "head," as the cabbage, are sown at unsuitable seasons, and in consequence are driven up to seed without these important preliminary processes. Thus very

late-sown turnips are often found to stand the winter unharmed, and at the opening of spring to run immediately up to seed. Early cabbage-plants that have been wintered also exhibit this tendency. Very early-sown beets and carrots often throw up seed-stems in the course of the first summer. Such seeds acquire an obstinate impulse in the wrong direction, which years of careful cultivation will scarcely suffice to overcome.

Climate has also an important influence in this respect. Heavy oats are not commonly raised in a hot, dry climate. In such a climate, fleshy, thick-leaved summer cabbages, of which the seed is saved through consecutive seasons, are not perpetuated, but, losing their improved cabbage habit, become leathery and worthless; and radishes are apt to become mere sticks; though, in regard to the latter, it is probable that, if it were deemed worth while, this climatic injury might be counteracted by wintering the seed-roots, or by a vigorous system of transplanting them with care and frequency. The refusal of lettuces to head finely when sown so late as to carry the period of maturing beyond the warmth of spring into the strong heat of summer, is due to the same cause.

STOCK OR CHARACTER.

When, in speaking generally, we say that certain vegetables are of "good stock," we mean that they are of good quality for consumption, and, with ordinary care, productive. But when we use this expression in reference to a particular variety, we may or may not include the idea of its intrinsic character; but we always mean that it has the true form, and the quality, whether good or bad, of its proper variety, and is in all respects free from intermixture. We sometimes in this connection call it, perhaps more accurately, "pure" or "genuine stock." In this work the terms "good stock" are intended to express both excellence of character and purity of kind.

From what has been remarked, it becomes plain that it is even more important to obtain seeds of good stock than seeds that will be certain to grow. It is also plain that there is some extra risk of injury to seeds raised in private or market gardens, from which vegetables are gathered for use or sale; so

that, on the whole, it will be found wiser to obtain them from seedsmen of reliable character, whose interests are also promoted by the sale of really good seeds, and who may be assumed to understand and apply to their production those principles upon which their excellence depends.

CHAPTER VII.

Fertilization, in perfect, monœcious, and diœcious Flowers.—Necessary to the Production of perfect Seed.—Modes of natural and artificial Fertilization.—Production of new Varieties of Vegetables.

FERTILIZATION.

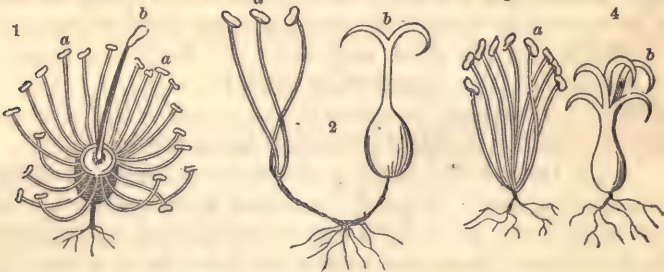
Fig. 60.



- a*, The Apple Blossom, a common perfect or bisexual Flower.
b, Cucumber Blossoms, a monœcious Plant.
 1, The Fertilizer, or false Blossom.
 2, The fertile Blossom attached to the young Fruit.
c, The Fertilizer, or false Hop-vine, with its blossoms,
d, The fertile Hop-vine, its blossoms being hid between the } a diœcious
 scales of the "Hop," Plant.

The following figures present the arrangement of the various floral organs without their petals, and are inserted for farther and clearer illustration.

Fig. 61.



- 1, A perfect or bisexual Blossom.
 2, Monœcious Blossoms, on the same Root.
 3, 4, Dioœcious Blossoms, on separate Roots.
a, *a*, *a*, Fertilizing Organs, or Stamens.
b, *b*, *b*, Fertile Organs, or Pistils.

All flowers have a sexual character, that is, they are furnished with fertilizing or fertile organs, or both, known in botany as stamens and pistils. For the most part, these organs grow together in each individual blossom, as in the apple and all our common fruit-trees, the flowers of which are perfect or bisexual. Flowers of this class are distinguished in botany by the number and peculiar character of these organs, which vary in the different Linnæan orders from a single stamen and pistil to an indefinite number of each (Figs. 60 *a*, 61, 1).

In some cases they reside in separate blossoms, though upon the same root, as in corn, melons, cucumbers, &c., Figs. 60 *b*, 61, 2; the topgallant in corn, what are called false blossoms in cucumbers, and melons, the catkins of the birch and hazel, &c., being only the fertilizers, which of themselves bear no fruit. These plants are called in botany "monœcious," or of one house. In others they are borne upon separate roots, as in

the hop, &c., Figs. 60 *c*, *d*, 61, 3, 4; asparagus, spinach, the papaw also, and persimmon, often the sassafras, and some varieties of our wild grape-vines, are of this character. These are known as "dioecious," or of two houses, the whole plant bearing the fertilizers being fruitless.

In mere seed or grain-bearing plants, the fertilization of the fruit-bearing flower or its equivalent organs—for some plants do not produce flowers, properly so called—is absolutely necessary to obtaining product. Thus, where single spears or hills of corn stand far apart from others, the ears never fill, because, whichever way the wind may draw, the fertilizing powder, as it falls from the topgallant, is carried away, and but little of it settles upon and fertilizes the silk, each thread of which connects with an incipient grain, and hence the failure.

In the various fruit-bearing plants, the fertilization of the fruit-bearing flower is equally essential to the production of perfect seed, and generally it may be regarded as important to the formation of fruit, inasmuch as the latter, being a mere appendage or covering for the former, may be supposed likely to fail with it; and such, in general, is the fact. The first dropping of young fruit, which, even after an abundant show of blossoms, sometimes extends to the whole orchard crop, is, I believe, mainly due to the imperfection or total failure of the fertilization, whether this arises from drought and glaring sunshine, from unseasonable cold, an inopportune storm, or from other less manifest causes; all such dropped fruit is seedless or germless. But at least a partial crop of fruit may be obtained where this fertilization has not been effected, as we sometimes find apples without seeds in the core; and in the larger vegetable fruits, as melons, &c., which are mainly results of cultivation, it is easily conceivable that, without fertilization of the flower, fruit may be produced, yielding, however, only shriveled and abortive seeds, or such as, if apparently full formed, yet actually lack the essential germ, and are, of course, without vitality. The "fig-apple," as it is called by Duhamel, which has only pistils, being destitute of stamens, as well as without petals, bears fair and tolerable fruit, but never yields seeds. In these exceptional cases of fruitful nonfertil-

ization it commonly happens that the fruit loses size, though it does not entirely perish. Of this the white Corinth or *Kismishi* grape, from which the seedless Sultana raisins are made, furnishes an interesting illustration. Its flowers are perfect or bisexual, yet, from some cause as yet undiscovered, it never produces seed, and, although its clusters are of fair size, the fruit upon them is not much larger than common currants; but, as we might expect in connection with this defective reproduction in the ordinary channel, the luxuriance and vigor of its plant-growth is prodigious.

INTERMIXTURE.

From this sexual character in flowers arises the possibility and danger of intermixture of kinds. This, however, is limited to species that are kindred to one another, which is generally indicated by a certain similarity in the appearance or construction of their flowers. Thus the varieties of cabbage, turnip, rape, and probably radish, all bearing cruciform flowers, readily intermix, when blossoming at the same time in close proximity, as in small private gardens, or whenever planted carelessly near to each other for seeding. Cucumbers, melons, pumpkins, &c., are equally liable to intermixture in similar circumstances. The product of seeds so raised becomes a mongrel and usually worthless combination; but cabbages and beets, or cucumbers and onions, &c., &c., never intermix, there being no congruity or affiliation between them. Certain plants also, which seem to possess this congruity, are not known to intermix, as the apple and pear, the currant and gooseberry, &c. The reason of this it does not seem easy to find.

In many flowers the organs of fertility are comparatively obscure or hidden by their peculiar arrangement; yet intermixture occurs readily among them, as in the various kinds of peas, and bush-beans, many new varieties of which have originated incidentally through careless planting or the sowing of mingled seed.

Sometimes the intermixture of kinds, whether by natural or artificial fertilization, is imperfect, and the new variety continues for years to be unsettled in character; or, instead of one

new variety, we obtain two, or even three, by easy selection, as in the case of the black, and white, and common mercer potatoes, which, though differing in appearance, are nearly similar in character, and all from one stock.

MODES OF NATURAL FERTILIZATION.

Natural fertilization is effected in flowers containing both the fertilizing and fertile organs by such an arrangement of the parts as secures the deposition of the pollen or fructifying powder shed by the former upon the latter, sometimes as it descends, and at others as it ascends, and in some flowers it is scattered upon them by an explosive force or bursting. In monœcious and dicecious plants the pollen is shed usually in great abundance by the fertilizer, and, floating in the air, or borne by the wind, aided perhaps by magnetic or chemical attraction, finds its appropriate place. This may be seen at once in any corn-lot when the ears are in full silk, the exposed end of each fibre of which is then dusted with the powder from the topgallant. Bees and other insects also carry the pollen upon them from flower to flower as they seek their food, and thus accomplish the same end.

MODES OF ARTIFICIAL FERTILIZATION.

Flowers of vegetables and of fruits are artificially fertilized by precisely similar processes, which may be described as follows :

• In all perfect flowers—that is, those in which the fertilizing and the fertile organs reside in the same blossom—watch carefully the time of the natural opening of the flower you wish to fertilize, and just as, or before it fully opens, insert the points of a very small pair of scissors, and clip off and carry away all the stamens, leaving the pistils alone, entire, and uninjured. When this is accomplished, take a newly-opened but full flower of the kind with which you desire to fertilize ; cut off, if necessary, all the petals or flower-leaves, and place it within the blossom to be fertilized ; or, without removing its petals, place it as a cap over the former in such a manner that its stamens may surround, or at least be near to the pistil.

This fertilizing flower, if it withers, may be repeatedly renewed, or rather replaced by fresh flowers, until the flower-leaves of the other begin to fade or fall. It is plain that erect blossoms, especially on fruit-trees, should be chosen for this operation, so that the fertilizing flower may rest securely in its place.

There is a more scientific mode of fertilization, in which this latter precaution is not essential. It is to prepare the blossom you intend to fertilize as above directed, and, taking care to mark the time of its maturing, which will be about the forenoon of the day in which the blossom becomes naturally full-blown, take one or more of the fertilizing flowers in the ripe state—that is, when the stamens willingly shed their pollen or dust, and, gathering this upon a fine camel-hair pencil, apply it lightly but freely to the top of the pistil or stigma.

A very little observation and practice will enable one to adopt this mode successfully. The general security for the result will also be increased by fertilizing several blossoms in a bunch, and removing the rest, or even all the bunches upon a small branch, reducing the number of the blossoms in each. To prevent the intrusion of insects, fix over, but not in contact with them, a gauze net, spread upon a wooden frame of any necessary form and size, which should be securely braced to the tree or branch so as to bear the wind, which may be left in its place until the fruit sets.

In plants that are monoecious, as melons, cucumbers, etc., or dioecious, as some grape-vines, it is only necessary to set the plants, to be fertilized by themselves, at least a hundred yards distance from any others of the same kind, and, taking off and carrying away all the mere fertilizers, or false blossoms, as they are commonly called, bring flowers from other plants and fertilize them by either of the processes described above, and with similar precautions against insects.

PRODUCTION OF NEW VARIETIES OF VEGETABLES.

The tendency of seeds to deterioration and intermixture, whether arising from their necessary proximity in small gardens, or from the interest, the ignorance, or the carelessness of

cultivators, gives importance to the production of improved varieties.

This is most commonly effected by careful and long-continued SELECTION, to which high culture should be superadded, in which we continually choose the most perfect or earliest plant, or fruit, or pod from which to obtain our seed.

Upon this latter principle rests the old familiar rule of taking for seed the cucumber or melon growing nearest to the root, etc. This rule, however, is seldom rigidly adhered to, and, if it were, would naturally tend to produce an earlier but smaller-fruited variety than the original.

Perhaps the most promising course for improvement is to choose the second, and generally finer fruit for seed; or, if the object be simply to avoid depreciating the variety, the whole crop, being left ungathered from the first, will yield satisfactory seed. Unless, indeed, it should happen that from peculiar circumstances the plant makes a very extended or a second growth, in which case the earlier product alone should be permitted to seed.

New and improved varieties are also sometimes obtained by careful and intelligent INTERMIXTURE, in which we aim to combine the desirable qualities of both the old varieties in the new one we expect as the product. This valuable result is also sometimes effected accidentally. In such intermixture the general rule is that the product will have the form and appearance of the fertilizer, with the character or peculiarities of the fruit-bearing plant. To illustrate this: Very early peas are generally small. Suppose we desire to produce a variety in which the seed should be larger, but the crop not materially later. Then, on the general rule given, we may fertilize the cedo nulli with the Spanish dwarf, and expect to accomplish our purpose; but if we fertilize the latter with the former we ought not to expect success, though it is not inconceivable that we might succeed, from the accidental concurrence of certain occult causes or combinations connected with the previous processes through which these varieties may have passed in arriving at their present state.

Intermixture is effected only between kinds that blossom at

the same time; and it is probably from blooming a little out of the ordinary season that certain kinds of peaches, and perhaps also apples, often or constantly reproduce seedlings like themselves. The several sub-varieties of the Newtown pippin apple, and other valuable fruits, sometimes attributed to soil, etc., are probably the results of exclusive and perfect self-fertilization in isolated blossoms.

New varieties are not unfrequently obtained by TRANSFER to a different climate. In a period more or less prolonged, the plant becomes acclimated, and its habit fixed in conformity with its new circumstances, and on being returned to its former latitude it can not be identified as one with the variety from which it sprang. The early Canada pea is an instance of this, being the early frame pea raised for a series of years in Canada.

The effect is precisely analogous to that induced without change of climate by taking only the very first formed pods for seed. The maturing of the crop is hastened, but its size and yield somewhat reduced.

Transfer to a southern climate tends, of course, in the opposite direction. All this, however, would be greatly affected by the absolute natural fitness or unfitness of the climate to produce the crop which it is sought to change.

New varieties are occasionally produced by DISEASE, which becomes hereditary, but of these it is not worth while to speak.

They are also often INTRODUCED from foreign countries, either by scientific research or under the stimulus of interest. The cocoanut squash (noted in its place) was introduced from Valparaiso by the late Commodore Porter; and the common large white kidney bush-bean, which now abounds in our stores and markets, was brought into New York from Madeira some thirty years ago, when dumpling beans were scarce. At that time it furnished the text for a free-trade article in the New York Journal of Commerce, which indicated clearly that the writer "knew beans."

CHAPTER VIII.

Sowing, Manner of; Time of; Depth of, etc.—Combination of Vegetable Crops.—Transplanting, Ridging, Hilling, etc.

SOWING.

MANNER OF SOWING.

IN broadcast sowing the land is generally laid off, either by furrows or sight-poles, into spaces of suitable width for two casts of the seed, which meet and slightly overlap as the sower throws the return cast; but in small lots the eye is often depended on to gauge these distances.

To perform the operation rightly, a basket or sheet containing the seed is slung upon the right shoulder and across the breast, so as to be partially under the left arm and governed by the left hand. The sower beats time as he steps, dipping a handful of seed with his right hand at each advance of the left foot, and casting it with a steady sweep as he steps forward with the right. A good sower does not cast the seed from his hand at once, and right before him, as in feeding chickens, which would cause it to fall in streaks, but, by adroit management with his thumb, and an upward cast, spreads it as it issues, causing it to fall in a broad, scattering shower, like the spreading jet of water drops from an engine-pipe when thrown into a showering semicircle by the finger of the engineer.

In broadcasting small beds or plots in the garden a pinch of seed is taken instead of a handful, but the same skill is used to spread it evenly as it is thrown.

In drill sowing, also, a large pinch of seed only is taken, which, in the process of sowing, is strickled along the drill by just such a motion of the thumb upon the fore and middle fingers as a skillful housewife uses in carefully salting a steak. A smart boy accustomed to the work will sow evenly, and of any desired thickness, at the rate of a fast walk, or faster in an emergency.

TIME OF SOWING.

The proper time for sowing varies not only with the various kinds of seeds, but often also with the same kind, according to the period at which the crop is expected to mature, or the use for which it may be wanted. Vegetables intended for spring or summer use, if hardy, should be sown in the fall or at the very earliest opening of spring ; if tender, the seeds should be sown and the plants prepared in hot beds, and be set out at the time of the principal corn-planting, or a little earlier if the object is deemed worth the risk. Unless the soil and location of your garden is very favorable, do not plant or sow your full crops, even of early vegetables, until the ground becomes warmed and free ; let a border, at most, suffice for extra early experiments.

By this practice you will often excel in the quality and yield of your crops, and sometimes in the earliness of their products. "On time, but not ahead of time," is as good a rule for the garden as for the rail-road.

For all tender vegetables, the planting time of the main corn-crop constitutes a fixed point at which, in all latitudes, it will be found safe to sow or set. The time of leisure between planting and first hoeing is the good time for farmers to make garden, the ground being plowed or dug a month or so before.

Those vegetable crops intended for winter feeding to cattle, and those of the same kind intended for the table, should not be sown at the same time, a large crop being a main object in raising the former, and excellence of quality chiefly desirable in the latter.

All crops for winter use should be sown late enough to avoid the summer heat upon the half-matured crop ; those intended for feeding to cattle as early as possible consistently with this indispensable rule ; while those for table use should be deferred to as late a period as may in any way consist with the probability of their maturing before winter. Through the cool weather of autumn all vegetables that have not been checked in consequence of too early sowing, or by some other cause, if properly cultivated, grow with great rapidity, and furnish prod-

ucts very superior in quality to those raised even from the same stock, but sown before the proper time.

Whenever root vegetables, having attained to from one fourth to one half or more of their ordinary growth, experience a check from any cause, it is almost impossible to start them anew so as to obtain either handsome or well-tasted roots ; they will, in general, be either hollow, or stringy and necked, or have an alkaline taste, or all of these may combine to render them worthless for the table, and of but little value for any purpose. Even if the check occur while they are quite small they are scarcely ever recoverable. The judicious cultivator will, therefore, so time the sowing of his winter root crops as to carry them clear of the summer heats and into fall weather, with its cool nights and heavy dews, while they are yet in the first or second stages of their growth. If this be done, and their after cultivation be faithfully attended to, he may reasonably expect a crop abundant in yield and excellent in quality.

North of latitude 40° the spring sowing of general crops may ordinarily be performed in April and May. Root crops intended for cattle may generally be sown with safety about the middle or latter end of June, and those intended for winter table-use from early in July to mid-August, according to the kinds ; but in southern latitudes, earlier and later sowing, with a longer summer intermission, becomes necessary. In a well-cultivated garden it will be found safe to allow about twelve weeks for the growth of fall-sown vegetables, counting from the time that their third leaves attain the size of a "squirrel's foot," though some of them, as turnips, or bush-beans for salting, will be ready for use in shorter time.

DEPTH OF SOWING.

It is sometimes imagined that the seeds of tap-rooted plants, as radishes, beets, &c., should be sown at a depth proportioned to the expected length of the product. Men otherwise intelligent occasionally entertain this puerile notion, and lay the blame of failure upon seeds which, in fact, they themselves have buried beyond hope of germination. The oaks that clothe our mountains sprang from acorns that were never buried ; all

self-sown seeds are cast upon the surface, and those which are covered deeply in plowing seldom trouble the cultivator until again brought near to it.

The following are general rules :

1st. Except in special cases, shallow sowing is to be preferred to deep.

2d. In dry, hot summer weather, seeds should invariably be sown in soil freshly dug or plowed, and should then be sown rather deeper than in the more moist and cool seasons of spring and fall.

3d. The depth at which seeds should be sown may generally be inferred from their size. If seed be very small, it should be sown on the surface, previously well pulverized, and be lightly and carefully raked in ; or when in small plots, simply stirring the earth with the hand or with a small stick will cover the seed sufficiently ; but seeds thus sown upon the surface, unless the weather be moist, should have a gentle watering for two or three evenings with the ordinary rose watering-pot, and be shaded from the strong sun. Seeds not very small, as radish, &c., may be sown in drills half an inch or an inch deep, or upon a surface left somewhat rough, and must then be pretty thoroughly raked in.

The larger seeds, as beets, beans, &c., may be covered from one to two inches deep, the latter depth being sufficient for the largest seeds in the hottest weather, if the second general rule be regarded.

COMBINATION OF CROPS.

This is a system of arrangement by which various crops are raised in the same season, and partly at the same time, upon the same ground. The planting of pumpkins with corn is a familiar instance among farm crops, and an increase of about one fourth has been supposed to result from alternating the rows of corn with potatoes. In the neighborhood of cities, where land becomes very valuable, it is common to sow in the fall upon the same ground alternate rows of lettuce and spinach or corn salad. The spinach or corn salad being cut very early in the spring, the lettuce may be cultivated for early head salad.

In the spring radishes are often sown broadcast upon land, and afterward beets or parsneps are sown in rows, or early cabbage-plants are set out at the proper distances for those crops. In due time the radishes are pulled, and the land left to the remaining crop, which then receives the ordinary culture. *See also* EARLY POTATOES and POLE BEANS, page 171.

Other combinations occur, as fancy or the variety of crops to be raised may dictate. In raising root-crops on a large scale, combination may sometimes be wise and profitable, as where either carrots, or beets, or parsneps are raised together with onions. The onions being sown at the very opening of spring in drills three feet apart, after they have been weeded and thinned—say early in June—the spaces are plowed, and two rows of either of the other articles named are sown at eighteen inches apart in the intervals; and the onions being gathered in August, the roots last sown are cultivated in the usual manner, and may yield from two to four hundred bushels per acre.

In any combination of crops, it must not be forgotten that the labor is generally increased, and, unless in land of extraordinary richness, and with special care in the cultivation, each crop will afford much less than a medium yield.

TRANSPLANTING.

Transplanting of fibrous-rooted vegetables is one of the most important operations of the garden.

It is sometimes assumed by writers on the subject of culture that it is highly expedient, if it be practicable, to sow all seeds where the plants are intended to mature, and that to transplant is not only additional labor, but a disadvantage to the crop. This may be true of tap-rooted plants, as beets, carrots, &c., because they can not well be removed entire and replanted in their natural position; but in reference to those which are fibrous-rooted, the very opposite of these conclusions will be found correct in practice. The labor of keeping in order an acre of cabbages sown in the hills for the first month after sowing will be found much greater than its thorough preparation for the crop while the plants are left for that period in the

seed-bed, being then, immediately after a final and thorough plowing of the land, transplanted to their appropriate places.

Transplanting, too, is an essential process in the superior cultivation of almost every variety of vegetable crop. Checking in some measure the natural tendency to wildness in the growth, it in the same degree tends to secure and hasten the perfecting of the product. A transplanted vegetable, whether plant or tree, other things being equal, will mature sooner than one left standing where the seed was sown.

It is indeed probable that repeated transplanting, accompanied by the stimulus of high nutrition, either experimental or accidental, were the chief processes by which our heading and fleshy-rooting vegetables have been obtained from their wild and worthless originals.

The reader will infer from what has been said that in all heading vegetables, if he would have superior products, he must cultivate highly, and transplant once or oftener while his plants are in the young growing state.

PREPARATORY STEPS.

By transplanting we generally, though not always, mean the final setting out of plants where they are intended to mature, and for this process there are preparatory steps of more or less importance according to circumstances.

1st. Plants, while very small, are often transplanted from the seed-bed, and set from one to three inches apart, or at such distances as will prevent their being "drawn up" and weakened by crowding one another, as well as to afford them room to form good roots. This is technically called "*bedding*," and, though not essential, will always prove an important aid to the cultivator, affording him strong, well-rooted plants, and enabling him to carry a little earth with each root in the final setting out of his crop, thus not merely securing the life of all, but, which in late planting is often equally important, their uninterrupted growth.

2d. This end is still more effectually attained in the case of the egg-plant, tomato, &c., by a second removal, technically termed "*potting*," in which such a number of plants, usually three,

as are calculated for each hill, are put into a small pot of rich earth, and placed in a slight hot bed two or three weeks before the final setting out, in which case, at planting-time, after a plentiful watering, they are carefully removed from the pot by turning it upside down upon the hand, with the plants hanging between the fingers, and starting the whole out unbroken by striking the edge of the pot gently upon any thing solid ; the whole ball of earth is then placed, with the plants it may contain, in the hill prepared for it. See HILLING.

3d. *Grouting*.—Immediately before young seedling plants of vegetables are pulled for any purpose, the bed, or at least that part of it from which the plants are to be drawn, should be thoroughly soaked with water, and, if needful, a small stick may be used to pry up the roots, so that they may retain some of the earth with them in transplanting. If from any cause they fail to hold the earth, it will be found of special importance that they be submitted to the process of grouting.

This is performed by mixing rich earth, to which cow-dung may be added, with water, to the consistence of soft mud, and dabbling the roots of the plants in it, not by thrusting them into it, but rather by drawing them through it, or, as it were, striking them upon it until each root is loaded. A dozen plants may be grouted at once ; and as they are held in the hand preparatory to this process, an inch or two of the root-ends may be cut off.

In the final transplanting, it is the general rule to set the plants of cabbages, peppers, and other plants that form a stem one or two inches deeper than they have previously stood ; but plants that do not form a stem, as celery, lettuce, &c., at the same depth as before. If the stems of young plants of the former class are very long, or, technically speaking, if the plants be "long-legged," they may be planted a little deeper than above directed ; but, whether the leg be long or short, the plant should never be put in so deeply that the earth reaches the leaves ; let these always remain above ground, and free to the wind.

MODE OF FINAL TRANSPLANTING.

The process of transplanting is a simple one, although requiring care and skill to perform it well and rapidly. Let us describe the operation. Having plants, stem-plants, of suitable size—that is, from four to ten inches' growth—either drop them at the proper distances, with their heads to the left hand, or place them in a small box or basket on your left hand, or sling them in an apron or pouch before you; take your dibber (*see* Fig. 59, p. 58) in your right hand, and half a dozen or so of plants in your left; separate one of them, as if slipping it out of the hand, but still holding it with the thumb and forefinger; make a perpendicular hole with your dibber of such depth as you judge the root of the particular plant you hold to require; rack your dibber quickly from side to side before you withdraw it from the earth, to enlarge somewhat the hole and prevent the surface sides filling it in; then put the root of your plant into the hole just made, an inch or two deeper than it stood in the seed-bed, holding it steadily with your left hand. The moment it is in position, force your dibber down about two inches to the right of it, not quite perpendicularly, but pointing inward, as if to pass under the root of the plant. As soon as the proper depth is attained, which should be about the same as that of the hole first made, bring your dibber upright to the side of the plant by a sudden motion of your right hand toward the left, thus pressing the earth against it from the bottom upward; having set it firmly in its place by this movement, withdraw the dibber, and a single stroke with its point across the side-hole will fill it in and complete the operation. In this manner a rapid planter will set from five to ten plants per minute.

If the distances for your plants are not marked, measure them with the eye as you plant, and proceed in the same manner to the end.

All transplanted crops should be lightly and carefully hoed within two or three days of the time they were set out, to start them at once and healthfully on their growth, and for the first two weeks at least should be daily watched, to catch the cut-worm, which may otherwise destroy them. *See* INSECTS.

CROP RIDGING.

Ridging for crop is performed in the preparation of the land for sowing or planting by first opening a furrow with the plow or spade, in which the manure intended for the crop is spread thickly, whereupon the two furrows, as in ordinary ridging, are thrown over it; the ridges being then partially flattened by running a rake or hook along each, or passing over them the back of a wide, light harrow, or a mere bar, or a roller, if the nature of the manure seem to require it, the seed is sown or planted along the centre, and covered in one of the ordinary modes. In ridging potatoes the seed is usually laid immediately upon the manure, and then covered and finished as above directed. Ridging for crop is often found economical and advantageous in mild, moist climates or on wet soils, but under all ordinary circumstances "flat culture" is preferable.

HILLING.

In agriculture, hilling is, like ridging, opposed to flat culture, but differs from ridging in that the hill is formed by throwing furrows together both ways by cross plowing.

When the crop is to be manured in the hill, deep furrows are run each way at suitable distances, and the manure, being carted on, is dropped into the furrow at the point of intersection. The planting of the crop is then completed either by dropping the seed directly upon the manure, as for potatoes, or by first hoeing over the manure a slight coat of earth, upon which the seed, as in corn or pole beans, is dropped, and the covering of both seed and manure completed with the hoe; or the manure, if coarse, is first covered by throwing together two furrows over it, as in ridging, and then planting the crop upon it with the hoe or other implement, the hills proper being formed in the after cultivation of the crop.

In gardening, and to some extent in farming also, the term "hilling" has become so far modified in its meaning as not necessarily to imply that the earth is materially gathered around the plants, but simply that the plants themselves are set, or the seeds planted in small clumps of three, or four, or

five, with spaces between the so-called hills greater than would be left if the plants stood in single line. "Hilling," therefore, in gardening, is opposed to "rowing," and may or may not involve the idea of a raised mound of earth.

The advantages of hilling are various.

1st. Crops set or sown in hills, even when the earth is not materially raised around the plants, are more easily tended than in rows.

2d. They are still more easily tended if the earth be so raised; the hilling-up from time to time enabling us to cover and thus stifle the young weeds which must otherwise be removed by hand.

3d. In crops requiring poles, hilling has the great advantage of one pole serving for several plants; and in corn-crops, the raised surface meets the strong stay-roots which are thrown out from the lower joint of the stalk and braces it against the wind, which in flat culture would be likely to prostrate the crop.

4th. All crops are probably benefited by some additions of fresh earth around the plants during growth, supplying new food to the young roots, which push rapidly into it, especially after the growing crop begins to shade the surface.

Hills, however, should always be made broad and somewhat flat rather than high and conical. The latter form throws off the water from the plant, the former retains it, thus co-operating with and seconding the natural arrangement by which each leaf of corn is made a groove or channel to convey moisture to the stem and plant; and each large leaf of the giant pie-plant, being slightly incurved, is set to catch the falling dew and rain, its stem forming the gutter by which it is carried to the root; and so of many other plants, with varied adaptation to the same end.

CROP PLOWING.

In large or farm-garden operations, where the rows are wide, much of the labor of cultivating crops in the progress of their growth is performed with the small single or the half mould-board plow, which are used in the ordinary manner of careful

corn and potato plowing, and generally should be followed by a light drill-harrow.

In certain crops, however, it is important to loosen the soil more deeply than can be safely done by either of these, and the skeleton plow is used, which, with a single narrow-stepping horse or mule, can be put beam deep, sometimes at the first stroke, and almost always at the second; and though it throws scarcely any furrow, yet it is well to follow it with a single stroke of the drill-harrow. The use of some one or more of these small plows, aided by a light drill-harrow, is of great value to growing crops. If frequently and faithfully used, scarcely any crop that is seasonably sown will be found to suffer from any ordinary continuance of drought.

HOEING.

The directions so often repeated in this work, to "hoe frequently and deeply," may seem to the inexperienced superfluous; it may be thought that hoeing is useful only for the purpose of killing weeds. The cultivator of a garden could scarcely make a greater mistake. It is admitted as a demonstrated fact in vegetable physiology that plants receive their food principally, if not entirely, by the spongioles, or extreme vessels of their root-fibres. Now in the deep hoeing of crops the extending roots of the plant are cut, and every tender growing root thus cut will in a few hours throw out several new ones, pushing in various directions, and some of these being cut by subsequent hoeings, the ramifications of the roots are greatly increased, and in an equal, or perhaps even in a greater ratio, their spongioles or mouths are multiplied.

Again: modern science has shown that ammonia is the great quickener and an essential supporter of vegetable life, and that the atmosphere is the reservoir or chief source for supplying it. By deep hoeing the soil is most thoroughly pulverized; it is so loosened that the young roots can seek their food with facility; it is opened to the air and dews of night, which bring with them at once the ammonia which furnishes the material of their food, and the moisture, combination with which is probably essential to its reception by the plant. (See Manures, p.

60.) This, however, like all other garden operations, may be performed wisely or unwisely. No set of rules will allow the cultivator to lay aside his judgment and common sense, and go on blindly to success ; but the following suggestions will be found useful in practice.

1st. In the early stages of their growth, all garden crops should be frequently and deeply hoed ; that is, in fruit or seed-bearing plants, as cucumbers, beans, &c., until the blossoms are about to appear ; in heading vegetables, until the heads are about to form ; and in root crops, until they are about to swell, or until they attain from half to three quarters of an inch diameter. Most crops, too, will be greatly benefited by being plowed or dug through between the rows, wherever this is practicable, at least once during their growth.

2d. Crops, when nearing maturity, if hoed at all, should be hoed shallow, unless it be at such a distance as will leave the larger roots entirely undisturbed. For this purpose, the thrust hoe may be used to advantage.

WATERING.

As a common practice or system, watering crops is not desirable ; but occasionally it may become necessary for a brief period, either upon newly-sown seeds in very dry weather, or young plants but recently set out. It should be done in the evening if at all, but generally it will be found better to depend on timing your crops well, sowing or setting them in ground freshly prepared, and cultivating them deeply, than on the laborious and often futile practice of watering, unless, indeed, as in rainless Egypt, the peculiarities of your climate necessitate systematic irrigation.

CHAPTER IX.

Insects; general Characteristics of; Changes of; Prevalence of.—Means of Defense and Offense against them.

INSECTS.

INSECTS, in general, complete the round of their life, or rather lives, in one year. There are some exceptions, however, as the well-known seventeen-year locust, and also some three and four year insects, as the saperda, the May-bug, and the spring beetle or snapper, parents of the apple-tree borer, the corn-grub, and the wire-worm. But, whether the period in which their changes occur be short or long, they are all definitely effected. The young are hatched, or the insect wakes from its torpor at the time of the opening of the leaves or flowers upon which they have to feed; and if, from any cause, they hatch before their food is ready, they die, although this rarely, if ever, happens.

They are air-breathers, with varied apparatus for this purpose suited to their condition, and changing with it. In the larva, or worm state, they are commonly furnished with spiracles or breathing-holes along their sides.

Their digestive apparatus consists, as in the snipe or woodcock, of a single uniform tube. In its passage through this simple opening, their food is elaborated, and the colorless blood formed. This, in their system of circulation, is carried with regularity from tail to head, and back again, passing in its return through the respiratory tubes. While in the larva or worm state, they are voracious and generally injurious. They eat, and digest, and spin through their allotted time, all the individuals of the same kind having equal life, however varied the limit of life in this condition may be in the different species. At the close of this definite period they take the chrysalis form, changing their appearance, structure, and mode of existence.

Having completed their organization and growth in the

chrysales, they become, by a curious metamorphosis, moths or butterflies ; they are entirely harmless to vegetation, not chewing, but sucking their food ; and after living a few days to perfect and deposit their eggs, they perish. Of those species which assume the form of beetles, having cutting or biting apparatus, some are injurious both in the state of larvæ and when winged. These do not spin cocoons, but the naked worm or grub passes through a state of torpor and change in the earth.

Most kinds of insects have periods, recurring at longer or shorter intervals, in which they are unusually abundant and destructive, becoming in a single season a scourge to neighborhoods or nations, and again declining to their ordinary numbers. They also vary greatly with climate, locality, and crop, each of these having its peculiar general classes or species. The soft, slimy insects, as the slug and snail, which are the pests of the garden in moist and foggy island climates, are scarcely known under our bright summer sun, except in peculiarly wet seasons ; and many of the insects of hot southerly latitudes disappear as we go north or rise high above the level of the ocean, or are found, like summer visitors, only in the heart of the season. In swampy lands, or by rivers, we find insects that do not frequent the dry uplands ; in sandy localities, those from which clay soils are exempt.

The pea-bug is not found in corn, nor the wheat-fly in Lima beans, nor the parsley-worm upon the cabbage, but each adheres to its appropriate plant or class of plants. Some, however, take a wider range in their depredations. The rose-bug attacks indiscriminately the blossoms of the rose, the peony, or the grape-vine, the leaves of the oak, the elm, or the linden, and the fruit of the cherry, &c.

Insects that infest or injure garden vegetables, however, do not materially differ south and north, but are found in all latitudes in their specific seasons. In general, they belong to the crop and the season rather than to the particular latitude, a single wet, cool season producing multitudes of the softer slimy insects, which a bright hot summer prevents or destroys. Most species of winged insects, on the contrary, are born and rejoice in the sunlight, and many larvæ, as the nest-worm and others

of the caterpillar tribes, are stimulated to their most lively voracity by the bright heat.

The remedies prescribed in this work will be found, in general, to apply to classes of insects rather than merely to single species, and may therefore be made available in any locality.

The first care of the cultivator should be to make himself accurately acquainted with the formation, character, and habits of those varieties of insects which his climate or locality may produce, or which his crops invite, particularly their times of first appearance and subsequent changes. Upon such knowledge, well applied, he may often find the profits of his labor depending. It is as necessary to him as the diagnosis of disease to the physician.

The known and reliable means of defense from the ravages of insects are very limited. The field of patient and intelligent observation and experiment in this department remains comparatively unexplored, and may be entered with abundant prospect of reward by any one of my readers.

There are, however, a few points which it may be useful to mention.

1st. Insects have natural enemies in the parasites, or ichneumons, that deposit their eggs in the body of the insect or its larva, or in the chrysalis. In these living nests the young interloper is hatched, and lives upon the substance and destroys the life of his victim. These hidden foes, of which it is probable each variety of insect has at least one, are always present, always active, and can not be eluded. Others war openly, as the short yellow worm, the larva of the syrphus, that lives upon the cabbage aphis, blind, but always following his prey; also the numerous aphis-eaters, as the larvæ of the spotted or "lace-winged" and "golden-eyed" flies, and the lady-bug, both in the larva and perfect state. These natural enemies we can transfer from plant to plant when necessary, thus putting them upon the track of their prey.

Among larger insects, their foes are the dragon-fly or darn-ing-needle, and especially a smaller blackish fly, looking like a cross between a dragon-fly and wasp, which hunts for his food with the activity and intelligence of a terrier. The birds, also,

and the bat live largely upon insects, which they consume both in the larva and the winged state, and the toad, though not a spry hunter, can often and expertly catch a fly.

Moles, also, and some ground-beetles destroy the various grubs that are hatched or harbored in the earth.

Some insects have protectors. Ants are said to guard the aphides, and, by a peculiar process, milk them, or, perhaps more truly, by a startling threat, to rob them of the sweet juices they suck from plants.

2d. We have also opportunities for escaping their depredations by changing a little the period of sowing or planting, though this also may sometimes expose us to other inconveniences.

Late-sown wheat has been found to escape, at least in part, the depredations of the fly or the weevil. Late-sown peas are not so liable to be punctured by the pea-bug, but they are peculiarly exposed to check and mildew from the heat, which by early sowing they would have escaped. But late-planted winter cabbages not only escape the cut-worm, but, if driven into rapid growth by careful after-cultivation, are improved in quality by the delay.

3d. Insects have tastes and distastes, of which we may perhaps avail ourselves in self-defense. As they carefully avoid certain plants, we may mix these with those which they attack, and try thus to shield them. Onion, hemp, tobacco, and tomato have been suggested and recommended for the protection of cucumbers, melons, &c., on this principle. There is, however, a difficulty in the application of it. A single plant of either of the three last named in each hill, left to grow unchecked, will monopolize possession and destroy the crop; whether if kept closely trimmed they would effect the end, or whether, if they would, the labor could not be better applied, are questions to be answered. The onion, as well as several small herbs with strong odors, may be well worthy of trial. We have also some other means of offending them, which will be mentioned in connection with the several insects.

4th. We possess some means of checking or getting rid of them. There are certain points in the history of insect life

when we may successfully assail it, viz.: *a.* In the eggs, which, in nests of from ten to a hundred, we may gather by hand, or scrape from the trees on which they are deposited. *b.* In the chrysales or cocoons, which are often more easily found and gathered than the eggs. *c.* In the perfect or winged state, by means of fires in their season. *d.* For those kinds which make nests, the period of weakness immediately succeeding the hatching of the young colony, when they may be crushed at once. We possess also various other means of injuring or destroying them. Upon some we may sow lime or plaster with effect; others are destroyed by drenching with fatty or soapy matter, which kills them by stopping their breathing-tubes, or with water, which simply drowns them, as the palmer-worm has been found to be destroyed by violent rain. We may gather them by hand, or entrap them with sweets, and in various other ways. But to all this labor there is a limit of wisdom, which it is not worth while to pass. The general principle may be confidently adopted, that only those insects which attack healthy crops and *cause* disease will repay the trouble of cure or catching. The sole remedy, or rather preventive, for those induced or invited by disease, as the root-worm, the cabbage aphis, the cucumber striped bug, &c., is the preservation of vigor in the crop by timely and suitable culture. In more than thirty years' experience and observation, I have never known a healthy crop of cucumbers materially injured by the striped bug, nor a diseased or checked crop that escaped the bug, or that was restored by the destruction of its supposed destroyer.

In the following list of insects, all that are injurious to garden vegetables in every locality may not be included, but the number inadvertently omitted must be small, and such descriptions, and directions, and hints are given in regard to those enumerated as will perhaps furnish aid in reference to others that may have been left out.

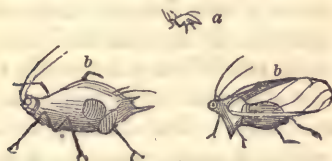
CHAPTER X.

Insects injurious to Garden Vegetables, &c.—Aphides.—Larvæ, or Worms.
—Moles.

WINGED INSECTS.

Aphides, or "Green Flies," &c.

Fig. 62.



a, natural size; b, b, magnified.

Cabbage Aphis,	Aphis Brassicæ,	} Fig. 62.
Corn "	" Maidis,	
Hop "	" Humuli,	
Lettuce "	" Lactucæ,	

The cabbage, corn, hop, and lettuce aphides, though distinguished by entomologists, need not be distinguished here. Their names indicate the particular plants they infest, the remedies are the same for all, and each, we may be sure, is pursued by its destroyers.

The first is found on all unhealthy and ill-cultivated cabbages, and the only remedy, or rather preventive, is good culture, successful in producing unchecked growth.

The second appears only occasionally, and usually or always upon the green ear-set of the corn, at the extremity of the husk.

The third is sometimes troublesome upon the hop, where it is cultivated as a farm crop. Showering with pretty strong tobacco-water, or sowing dry ashes, or lime, or plaster upon them in the dew, are worthy of trial with a view to their prevention or destruction.

The fourth is found only on the seed-stalk branches of the lettuce, and the applications above named for the hop may be used for this, if found needful.

CUCUMBER BUG. (Striped.)

GALERUCA VITTATA.

The striped cucumber bug is an active black and yellow striped beetle, about one fourth of an inch long, which attacks the cucumber, melon, and other kindred plants, especially when from any cause those plants become diseased or checked in growth. It eats the leaf tissue until the veins only are left as a net-work, and fastens upon the stem just at the surface of the ground, and



eats into its substance. Fortunately, well-cultivated and healthy plants escape it almost entirely, or easily outgrow its injuries; but plants in poor or cold soil, or where the seed is sown or planted while spring is yet only coming, or too directly upon heating manure put into the hills, or in a continuous drouth in hot sand or gravel, will either perish quickly under its attacks, or linger along and fail at last in spite of effort to restore them.

Various preventives, some of which may be worthy of farther trial, have been suggested, such as planting an onion, or a tomato, etc., in each hill. Numerous remedies have also been proposed, as soot, lime, ashes, plaster, snuff, etc., to which may be added, as equally efficient, sand. They are all mere temporary disturbers of the insect, which, from its timidity, retreats instantly upon the slightest annoyance, either hiding quickly under leaves, or in the earth, or at once flying away. They may apparently be almost driven in a flock by a liberal broadcast of any powder, but for the rest, even if it be Scotch snuff, it may be presumed they only sneeze.

Let your ground, then, for these crops be thoroughly prepared, wait for warm weather to plant in, and when the young plants appear, let them have prompt and continued care, and, if need be, stimulus, as liquid manure, until they are beyond

the reach of the bug. (See also Squash Bug.) Besides these, cucumbers are sometimes troubled with a small jumping beetle, like the turnip bug, the *Haltica cucumeris*, for which the proposed remedies for the striped bug may be found really useful, particularly soot, ashes, or snuff.

PEA BUG OR WEEVIL.

BRUCHUS PISI.

This is the small brown bug sometimes so abundant in dried peas, and is produced from an egg which generally is deposited in each of the young peas by puncturing them through the pod while it is yet tender. Occasionally, however, in very large peas, two or even three punctures will be found on the same side, the operator having mismeasured distance; and sometimes they are punctured on both sides, probably by different individuals, the last one unaware that the dwelling was already tenanted.

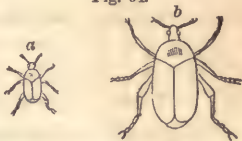
Nearly on the opposite side from the round hole by which the bug finds its outlet from the ripe seed a small brown spot will usually, if not always, be found upon the pea, which is the healed puncture where the egg was deposited.

The insect makes these punctures along the side of the pod, and the general course taken by the young worm being more or less directly to the opposite side, it becomes apparent that the eye of the pea, which is at the point of attachment to the pod at its inner or front edge, will seldom be injured; but, notwithstanding this, peas which the bug has eaten should not be used for seed, especially in a cold spring, when, not vegetating quickly, they are apt to water-soak and rot.

The pea bug belongs to warm weather and localities. It is unknown in high northern latitudes, and any where north of 40° it is avoided by selecting an elevated region, or by putting off sowing until the latter end of May.

The crow blackbird and the Baltimore oriole are said to seek the young worms, but are of no practical importance as destroyers.

Fig. 64.



a, natural size; b, magnified.

In small quantities seed-peas may be scalded, while stirred, before sowing, which is said to destroy the bug; more confidence may perhaps be placed in soaking until the peas begin to vegetate, and this may be safely done if they are then rolled in plaster (gypsum), quickly sown upon fresh-plowed land, and covered without being suffered to lie exposed to the sun. Or we may sow only two-year-old seed-peas, keeping them in tight barrels, and sifting out and destroying the weevils in the spring or summer of the first season. It is presumed that the insect deposits eggs only in the pea, and if so, it would seem to be dependent upon our care of the offspring for perpetuation.

SQUASH BUG.

COREUS TRISTIS.

The squash bug, sometimes erroneously called turtle bug, is

Fig. 65.



Magnified nearly twice the natural size.

generally a dark brown or blackish bug, rather quick in its movements, ridged across above the shoulders, the whole having an angular or lined appearance, somewhat resembling a shield with its quarterings. It is a foul, fetid bug, the companion of the striped cucumber bug in its ravages among vegetable vines. It is less numerous and less lively, but larger and more destructive in proportion to its numbers, eating the leaf more voraciously, and more completely destroying the stem. Its eggs are laid in June and July. It is timid and quick to hide, but may be caught by hand in the cool of the morning from any crop which it infests, and crushed. It often enters the house in the fall of the year.

TURNIP BUG OR FLY.

HALTICA NEMORUM.

A little black bug or beetle, about one tenth of an inch in length, which springs when disturbed, and on this account is by some called Jumping Jack. In certain seasons the various species of this insect become very numerous upon the young

plants of turnips and cabbages, sometimes eating them entirely off before the third leaf is formed. When prevailing, they destroy with equal promptitude the plants in a small seed bed or a breadth of acres.

Fig. 66.



a, natural size; b, magnified.

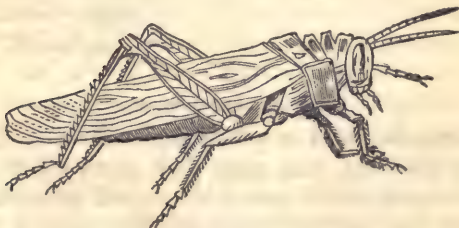
Soaking and stirring the seed in sulphur water, and rolling the surface after sowing, have been recommended as preventives, as well as the sowing of ashes and plaster upon the young plants; and where the turnip crop is esteemed, they are sometimes caught in the throat of a light bag, made with a pronged frame in the fashion of a shrimp-net, which is carried steadily over the surface of the land in precisely the same manner as the shrimp-net is carried over the flats. But as it is a short-lived pest, it is generally better to dig or plow the ground a second time, and resow the crop, taking care to give it a vigorous start.

For this purpose, few things will be found more efficient than coating the seed thoroughly with common whale oil, and drying it off with plaster immediately before sowing, taking care to cover it completely but lightly, and gently roll the ground, or beat it moderately with the back of the rake.

GRASSHOPPER.

ACRYDIUM FLAVOVITTATUM.

Fig. 67.



Natural size.

Once in a series of years, particularly in certain localities, grasshoppers become a resistless scourge, consuming every young green crop; but in ordinary seasons the garden may be defend-

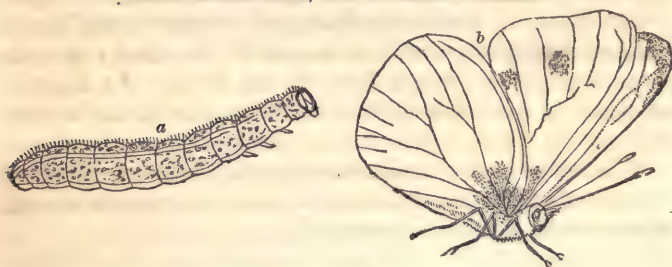
ed against them by incessantly driving them with sand thrown broadcast over crops as often as they are attacked, aided by fowls, particularly broods of young turkeys, which thrive finely upon them.

LARVÆ OR WORMS.

CABBAGE WORMS.

Fig. 68.

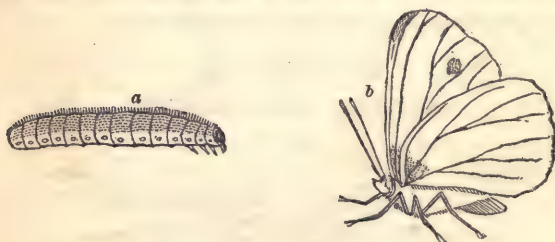
LARGER CABBAGE WORM, WITH ITS PARENT BUTTERFLY.



a, Larva; b, *Colias Philodice*.

Fig. 69.

SMALLER CABBAGE WORM, WITH ITS SUPPOSED PARENT BUTTERFLY.



a, Larva; b, *Pontea Oleracea*.

These are pale green or yellow worms, from an inch to an inch and a half long, with some dark spots, which are found more or less every season upon cabbages and some other plants. Individually they are fast feeders, but their number is limited, and of course so is the injury they do. Birds also destroy them. They should be hand-picked and crushed. These worms are the progeny of the common large and small white and spotted butterflies.

There is another pretty spotted worm that coils itself up on the cabbage ; it is the painted caterpillar, larva of the *Mamestra picta*. It is rather rare, and its appetite not very voracious.

The larva of the *Cerostoma brassicella* is a yellowish green worm, described by Fitch as about one third (0.35) of an inch long, and of the thickness of a coarse knitting-needle, tapering somewhat to both ends, with sixteen legs, and very active, having sometimes a dark head. The moth which produces it is about the same length, and of an ash-gray color.

The worm, in certain localities, appears upon the cabbage in October, particularly in dry seasons, and feeds chiefly upon the loose outer leaves, thoroughly riddling them. At length it spins a thin gauze-like cocoon, which it attaches to the eaten leaf.

It is not extensively injurious, but simply disagreeable upon a vegetable intended for food. It has its parasitic foe, the smaller brown cocoons of which will be found near by.

CORN GRUB.

Fig. 70.

LARVÆ, WITH THEIR PARENT BUGS.



a, a, Larvæ.

b, *Melolontha vulgaris*, or May-beetle.c, *Melolontha copris*, or Tumble-bug.

The corn grub is a whitish, fat, disgusting grub, from one to two inches long, which is often found greatly to injure corn

as well as grass by eating the roots, sometimes destroying them so completely in sod-land that the grass may be rolled from the surface like a sheared fleece. It especially prevails among corn or potatoes planted in newly-plowed sod-land. Plowing in the fall has been thought to expose the grub to destruction by the frost, the birds, &c. On spring-plowed sod lime sown at the rate of forty bushels per acre, or salt at the rate of five or six bushels, before the last harrowing, will be found of advantage. The fall plowing is probably to be preferred, and, if convenient, the lime also may be applied after the spring plowing. Crows, jays, and some other birds seek the grubs eagerly, and destroy large numbers of them every season.

Their changes are completed in the ground, and in due time the MAY-BUG makes its appearance. This is the rather large, short, light brown beetle, with rough, or ridged and slightly-punctured wings, and feet that feel like claws, which abounds in cherry-trees in the spring evenings, flying with a humming sound, and often striking with some force against an object in its track, when in general it quietly settles and folds its large gauze inner wings entirely under the hard cases which cover and shield them. In the day it lies quietly among the leaves, or returns to its hiding-place in the sod. Its eggs are deposited in the earth, and in two weeks the small grubs are hatched.

The European variety of May-bug, which ours closely resembles, becomes a scourge at times, stripping whole forests of their foliage; and it is generally said that ours eats the leaves of cherry and other trees. Fitch reports a single instance of its serious depredations, but I have never known it to do noticeable injury to any thing, and mention it among injurious insects only on account of its connection with my subject as parent of the corn-grub. As the May-bugs are, in general, much more easily caught than the grub, it is desirable to destroy them as far as possible. They may be caught in numbers at midday, and more freely toward evening, by being shaken from the trees into a sheet, and destroyed by crushing, or scalding, or fire.

The grub of the tumble-bug or dung beetle, *Melolontha copris*, is supposed to have similar bad habits with the former,

but it is comparatively scarce and of little consequence, and the same natural enemies repress its increase.

CUCUMBER BORER.

LARVA OF *ÆGERIA CUCURBITÆ*.

The winged insect is orange-colored, with some black spots on the body, and black and orange-colored hairs fringing its legs. The eggs are deposited near the roots of the plants in July and August.

The larva is a small worm that sometimes destroys cucumber and squash vines after they are well grown, or even in fruit, by eating off the skin of the main root, and boring it, when, of course, the whole vine wilts and dies. It is not very common, but in some seasons makes naked spots in the squash or cucumber patch. All vines found wilting from this cause should be immediately carried away, and the stems and roots be burned, or boiled, or macerated for some hours in water poured hot upon them, thus preventing the perpetuation and increase of the insect.

CUT WORM.

Fig. 71.

LARVA, WITH PARENT MOTH.



a, Larva.



b, *Agrotis devastator*.

This moth, says Fitch, is of a grayish brown, and, when spread, measures from an inch and a quarter to an inch and a half across. Extending from the base of the wing along the inside of the inner stripe is a broad black or dark-brown streak, crossed by two slender pale bars, not parallel, whence it is named the dart moth; this is its distinctive mark.

The moths that become the parent of the cut worm are not certainly known, but are supposed by Dr. Fitch to be the dart moth above referred to, and other evening or owlet moths of similar character.

The eggs are dropped upon the ground in the latter part of summer; they soon hatch, and the young worm crawls into the ground and feeds upon the roots and young shoots of herbaceous plants. When cold weather comes it descends a few inches below the surface, and remains torpid till spring. Late in the summer it becomes a chrysalis, which resembles a long, thin egg, of a chestnut-brown color, having several impressed rings or joints toward its pointed or tail end. From this, in three or four weeks, the miller or moth comes forth, the parent of another generation.

The cut worm is of various shades, from light drab to black, and of different varieties, which are not clearly distinguished by writers on insects. Most of them have the habit, whence their name is derived, of cutting off the young leaves or tender stems of plants just above the ground, and drawing them into the mouth of their hole, furnishing, like some other thieves, a clew to discovery by the effort to hide.

The red-headed cut worms, or tiger worms, found south of New York, cut under ground. Their depredations are continued throughout the summer upon the young corn, beans, peppers, etc., but they are most numerous in June and July, at which time they are so destructive to the young, freshly-set cabbage-plants that it is common for market-gardeners to defer planting until they disappear, which they generally do near New York before the first of August, going deeper into the ground, and assuming the chrysalis form.

The crow, with some other birds, and a species of dragon-fly, are inveterate enemies of the cut worm, and Fitch recommends the making of deep holes with a stick about their places of resort, into which they fall, and, it is supposed, can not get out. This, however, would appear not only doubtful, but also as involving, perhaps, more labor than the ordinary and direct course, which is simply to glance along the rows of your crop early in the day, and, wherever the presence of the marauder is

detected, either by a cut leaf or a wilted plant, search for him just below the surface and crush him.

HEART WORM.

Called also Top Worm. Spindle Worm.

LARVA OF THE GORTYNIA ZEA.

The moth is of a rust-red color, somewhat mottled with gray, and having a few black dots.

The larva is a rather slender and active yellowish-green worm, with dark head, and spots and rings. It is from half an inch to an inch long. Hatched in, or entering the side of the corn-plant, it eats into it when from three to nine inches high, consuming the heart or spindle of the young spear, and where it abounds the crop of corn is greatly lessened or destroyed. It infests also the dahlia and some other plants. Remedy: catch and crush him, or stop his hole, and pour into the plant a little weak ley. Perhaps, if attended to early, he might be crushed, without injuring the growth, by carefully compressing the young spear between the thumb and finger, or a fine wire passed into his hole might pierce him.

The "corn-borer" or bill-bug of the South is of similar habit, though operating upon the crop at a later period of its growth. The same remedies may be used for both as far as practicable. For the latter the annual fall burning of the corn-stumps, in which the chrysales are formed and pass the winter, has been found an effectual check.

HOP WORM.

LARVA OF THE HYPENA HUMULI.

The hop worm is about an inch long when full grown, of a greenish-white color, watery-looking or semi-transparent, and slightly striped and dotted, having fourteen legs. The mouth is yellowish, and the tips of the jaws black.

The moth is about an inch long, and varies in color from quite dark to a dull white. The worms appear early in June, and continue until late in August, feeding upon and nearly consuming the tissue of the leaves.

The common remedy of syringing or showering the vines with strong soap-suds, or with a solution of whale-oil soap, is prescribed for this and some other insects which commonly or occasionally infest hop-vines.

PARSLEY WORM.

Fig. 72.

LARVA, WITH PARENT BUTTERFLY.



a, Larva ; b, Papilio Troilus.

This is a yellowish-green worm, with black streaks and spots, and a pair of hidden yellowish fleshy horns, united at the base, which it throws up when disturbed, and from which an offensive and sickening odor is emitted. It is from an inch to two inches long, not very numerous, but rather voracious. It feeds upon the parsley, parsnep, and some other plants. The only known remedy is to catch and crush him.

ROOT WORMS.

TURNIP ROOT WORM.

LARVA OF ANTHOMYIA CANICULARIS.

RADISH ROOT WORM.

LARVA OF ANTHOMYIA RAPHANI, OR RADICUM OF EUROPE.

ONION ROOT WORM.

LARVA OF ANTHOMYIA CEPARUM.

The anthomyiæ, which, according to Harris, are the parents of these various root worms, are the small "flower flies," which

appear and swarm like certain kinds of gnats, or like the small flies that frequent foul spots and ordure.

The worms are white, and usually from a quarter to half an inch long. They are found only in diseased vegetables, as stunted radishes, cabbages, or turnips. The true remedy is to pull and burn or boil the crop as soon as it is discovered to be infested, and endeavor to avoid such necessity in future by timely sowing and good culture.

WIRE WORM, OR RED WORM.

Fig. 73.

LARVA, WITH PARENT
BUG.



A reddish-brown worm, produced by the click-bug, about an inch long, with a very tough, smooth skin, slightly hinged or jointed. It enters the root or under-ground portion of the stem of plants, and eats its way up through the heart, causing death.

Generally these insects are rather scarce and shy, but at certain periods, and in different and limited sections, a sudden and large increase takes place, and they become very destructive to corn and other crops. Among garden vegetables they sometimes attack lettuce, and the pink tribe among flowers. They can scarcely be crushed in the earth; to catch them by hand, and either cut or pull them in two, or crush them upon a stone, seems the only promising mode of open warfare; but they are sometimes baited with slices of turnip or potato laid upon or just under the ground, which they enter, and are gathered daily and destroyed.

BEE WORM.

Fig. 74.

LARVA, WITH PARENT MOTHS.



a, Larva; b, *Galleria cereana* (male).

The bee worm is a yellowish-white worm, with brownish

Fig. 74.

c, *Galleria cereana* (female).

dots, having sixteen legs. When first hatched, it is not much thicker than a thread, but attains its full size in about three weeks. The moth is about three fourths of an inch long, of a dusty gray color, dashed with purplish brown, the female being somewhat darker and larger than the male. The wings, which slope back flatly, are notched, and turned up a little at the end. The moth lays her eggs in the dirt or crevices near the mouth of the hive, or enters at night and deposits them in the chinks inside. In about two weeks the small thread-like worm is hatched, which soon becomes covered with a silky tube, spun from the wax on which it feeds. Keeping itself always incased in this, where the bees' stings can not penetrate, or masked by a thick coating of wax, which prevents their approach, it labors incessantly to destroy the cells which the bees have so industriously and skillfully built. Two broods are hatched in a season, and if neglected through the summer, the strong silken cocoons or webs become, by the beginning of fall, very numerous in the infested hives, and almost the whole of the comb broken and defiled, so that at length the bees are wearied and driven out. In hot and dry seasons they are most troublesome, especially to weak swarms.

The presence of the bee worm in a hive may be known by the wax-dust and black castings of the worm lying upon the floor. If the quantity of these is small, a careful examination of the upper parts of the hive, destroying the worms as you go, may suffice; but if large, showing that the enemy is in considerable force, you had better *drive* the bees, that is, provide a hive of the same size, put in plenty of rests or cross-sticks, and wash the inside with hop tea sweetened to a sirup; early in the evening, before the bees get very sleepy, having closed the mouths of both hives, turn the old one bottom upward, and quickly fit the new one over it; drum upon the outside of the former, and the bees will leave it. Before morning, place the new hive upon a new, clean stand, with food upon it sufficient for a week; shut in the bees for that time, and for the second

week keep them fed, and let them out only in the edge of the evening, affording them no time to wander. If found necessary to strengthen them in their new home, feed the contents of the old hive to them, or supply them freely otherwise.

The following arrangement might perhaps prevent the depredations of the enemy. Place the stand for your hive upon a single centre pillar, and take care that it is no larger than the hive, except a small projection in front of the entrance; put an apron of tin entirely around it, extending an inch or two below the edge; let it spread upon and cover the small "door-step" of the hive. Close even the minutest crevices all around with grafting composition No. 3, and whenever there is peculiar risk of injury from the insects, fit to the door of the hive a slide of woven wire, to be closed every evening during the moth season.

MOLES.

Much injury sometimes results from the running of moles in a garden, particularly in light soils, but they also do good in the destruction of various insects inhabiting the soil, often more than counterbalancing their injuries. If they become too numerous, they may be caught with a hoe or hook, if watched for at their ordinary meal-times, morning, noon, and evening. Sometimes they are caught in a small twitch-up trap. There are also various patent traps for the purpose, which are more or less efficient. A clergyman in New Jersey has recently invented a spiked dead-fall trap, which is said to be unusually effective.

It is stated that pieces of salt codfish put into their runs, or castor-beans planted here and there in the garden, will drive them away. Any of these expedients may be tried, if thought worth while.

CHAPTER XI.

VEGETABLES FOR THE GARDEN.

Vegetables for the Garden, etc., with Descriptions and Directions for their Culture.—Assortment of Seeds for a Family Garden.

ARTICHOKE.

French, *Artichaut*.—German, *Artischoke*.—Spanish, *Cinauco*. *Aleachofa*.

PURPLE, GREEN, ETC.

BRIEF DIRECTIONS.

Sow thinly, or drop single seeds at a distance of three or four inches in drills one inch deep and twelve inches apart. Keep them perfectly clear of weeds, and hoe them often throughout the season.

The following spring transplant them into very rich soil, in hills four feet apart each way, setting one, two, or three plants in a hill. Keep them clean and cultivated as before.

Cover them well with earth or litter for winter.

Time : sow or transplant in early spring, say April at New York.

The purple (flowered) or green-globe artichoke resembles a huge thistle-head, formed with broad, thick scales. The heads are cut when of full size, just before blossoming, and being well boiled, are served up with drawn butter.

The eatable part consists of a thin layer of soft marrowy substance upon the inside of each scale, and the thick, tender, tabular base or bottom upon which the scales and down of the blossom are set. It may be cultivated as a tit-bit for an epicure, but would not form a very substantial contribution to a farmer's table.

It may be raised from seed sown at the opening of spring or from young suckers ; it requires deep rich soil, and the plants or hills should stand at least four feet apart each way. A good winter protection of earth or litter is advisable, to be re-

moved at the opening of spring, when the earth should also be lightly dug about them, and the hills dressed.

The time to cut the heads for use is immediately before the appearance of the blossom, just when the centre of the head begins to open.

JERUSALEM ARTICHOKE, *HELIANTHUS TUBEROSUS*.

French, *Poire de Terre*.—German, *Erde Apfel*.—Spanish, *Girasol*.

This is a tuberous-rooted species of sunflower, which affords tolerable food for hogs when planted in a low rich spot, of which it can have full possession until the swine are turned in to root it up; it needs only to be once planted in the manner of potatoes to insure a large crop every year, if the hogs are kept out until fall, when they will leave enough seed in the ground for the next year's crop.

This root is sometimes used for pickling, or eaten cut up in vinegar as cucumbers, and still more rarely boiled for use by those who happen to fancy a sweetish, watery potato, which, when cooked, it nearly resembles. It has been used to some extent for sheep, and even the tops cured for winter fodder, but it is probably comparatively valueless for these purposes.

ASPARAGUS.

French, *Asperge*.—German, *Spargel*.—Spanish, *Esparrago*.

GIANT, WHITE, GREEN, ETC.

BRIEF DIRECTIONS.

Sow thinly in shallow drills twelve inches apart. Hoe often, and keep perfectly clear of weeds. At one year old the plants may be transplanted into permanent beds, at one foot apart each way. Time: sow in the fall or as early in spring as practicable. Transplant in spring.

Asparagus is a well-known and delicious vegetable; it is raised from seed, which may be sown in fall or early spring. The plants at one or two years old are transplanted into beds at one foot apart each way, or, if cultivated upon a large scale, into rows at three feet distance, so as to admit the plow, the

plants being set one foot apart *in* the rows. It is absolutely necessary to give asparagus a warm, rich soil, and, if it is intended to make a permanent bed for a private garden, it would be well to dig out the whole space, and underlay the bed with six inches or more of well-rotted manure, or trench the ground at least eighteen inches deep, mixing it thoroughly and plentifully with such manure in the process, adding sand or road-wash if the soil be heavy.

Let the bed be so prepared in the fall, and in spring, having dug it over, raked it smoothly, and with your marker laid it out in one-foot squares, put in your plants exactly at the points where the lines intersect, covering the crowns about three inches deep. Keep it perfectly clear of weeds, and, if a drought comes on, give attention to watering it.

One year from the time of planting you may expect a light cutting for the table; but you had much better not cut any the first year after planting than risk the injury to your succeeding crops by cutting too much.

Top-dress your bed with well-rotted manure every fall, dig the surface lightly over in the spring, and water it with the old brine from your pork-barrel, or strew salt over the bed.

By this process you will have asparagus sufficiently gigantic; and, if you desire it white, cover your bed six or eight inches deep with road-wash or beach sand, and cut the asparagus at that depth with a long knife whenever it shows itself an inch or less above this covering.

In cultivating asparagus upon a large scale, let your land be most thoroughly manured; set the plants four inches deep, in rows three feet apart, and one foot between the plants in the row; keep it clean with the plow and drill-harrow, or cultivator, manuring it every fall if possible; and, if you choose to plow in the manure lightly across the rows, as if the ground were uncropped, it will bear the operation carefully performed without injury to the next year's product, and with great advantage in keeping it clean with little labor.

BEANS (English).

French, *Fève de Marais*.—German, *Grosse Bohne*.—Spanish, *Haba*.

BROAD WINDSOR, LONG POD, &c.

BRIEF DIRECTIONS.

Drop the seed at about three inches distance, in drills two inches deep and two feet apart.

Hoe often, drawing the earth to them a little from time to time until they are in full bloom: then nip the end of each stem an inch or two, and wait for the crop.

Time: the earliest possible in spring both South and North, or through the winter months in the former.

These beans, if raised at all, should be planted in strong moist soil at the times and in the manner above directed.

They are used as shelled beans, being gathered when the pods attain their full size, but while still green and tender.

Though a favorite vegetable with some, they are rather a coarse delicacy, and are not likely to be generally esteemed. Commonly, too, they do not bear well with us, and if but a slight drought come upon them in their growth, the black aphid will eat them up.

The horse bean is a small variety of this species, which in Europe is raised extensively as a farm crop. It is commonly mixed with oats in feeding horses, being considered very strong food, and from its heating quality requiring to be used in moderate quantities.

BUSH BEANS.

French, *Haricots nains*.—German, *Stambohnen*.—Spanish, *Frijoles*.

BUSH BEANS. DWARF BEANS. KIDNEY BEANS. CRANBERRY BEANS. SNAPS.

Early Mohawk. Early China. Union. Rob Roy. Valentine. Large White Kidney. Marrowfat. Refugee, etc., etc.

BRIEF DIRECTIONS.

Sow thinly in rows from eighteen inches to two feet wide, and about an inch deep; hoe often, drawing the earth a little

to them, and sow plaster upon them at least once before they blossom.

Time: corn-planting time for spring. July to October, according to latitude, for fall use or salting for winter.

At New York, May to August.

Bush beans are sometimes called kidney beans from the form of many of the varieties, and cranberry for the same reason; snaps from their being used while the pods are sufficiently tender to snap without showing fibres, and dwarfs or bush beans from their habit of growth, not requiring poles, but being self-supporters.

These beans may be planted from the very earliest corn-planting time to the last month of summer at the North, and at the South on into September. In favorable weather six weeks for the earlier kinds, and eight weeks for the later, will be found long enough to allow for the production of the green crop. They should be thinly sown in rows about eighteen inches or two feet apart, and covered about an inch. Hoe them well as soon as they come up, earth them up a little as they grow, sowing plaster lightly over them from time to time, and there is scarcely a fear of failure.

For early kinds, the Mohawk, the China, and the Valentine may be sown. To succeed these, the Union, the Rob Roy, the marrowfat, the large white kidney, and the refugee.

The China, the white kidney, the marrowfat, the Valentine, the Union, are all superior to the common white or dumpling bean for winter use in the dry state, and on this account are preferable to the darker colored beans, which, when dry, are unfit for cooking, dark-colored beans being both strong and unsightly. The refugee is perhaps the best bean to plant late for pickles, or for salting green for winter use as a table vegetable.

For this latter purpose the beans are prepared as for cooking, many persons splitting the pods in the process, especially if they are pretty large or old. They are then slightly scalded, and when cool are packed closely into a keg or barrel, each layer being carefully but moderately salted, and a few sprigs of summer savory or other aromatic herb added. When required

for cooking, they are soaked a while to remove the excess of salt, and then boiled in the ordinary manner. With proper care they will keep good until spring.

In raising beans in large quantities the land should be furrowed with a horse-marker or light plow, about two feet apart, and the beans sown by hand, and covered with the potato-hook; or any good corn-planter may be used, which will complete the operation at once.

The after-culture should be performed with the skeleton plow and light harrow, or the cultivator, to keep them clean, and either a single or a double mould-plow to slightly earth them up, after which but little finishing off by the hand-hoe will be required.

For analysis of bush beans and their value, see page 500.

POLE BEANS.

French, *Haricots à rames*.—German, *Stangbohnen*.—Spanish, *Judias*.

LARGE LIMA. SMALL LIMA OR CAROLINA. HORTICULTURAL. DUTCH CASE - KNIFE. ASPARAGUS. SCARLET RUNNERS, &c., &c.

Time: throughout corn-planting time both North and South. At New York in all May.

Pole beans require to be planted in hills from two to four feet apart, in which poles should be first set securely by the aid of a crow-bar.

Plant four or five beans an inch and a half deep around each pole, and from four to six inches from it. When well up, hoe and thin them, leaving three or four of the strongest and most healthful plants; keep the earth well hoed and loosened about them; and when they begin to run, guide them to the pole if they do not find it readily, being careful to wind them in the natural direction.* Continue to keep the earth loose and clean

* Vegetables and woody plants that wind in their growth do not all wind in one direction, but each kind winds uniformly in its natural course, and no other. The honeysuckle and the hop wind "with the sun"—that is, the point of the vine in its progress passes from the south by the west, and north and east to the south again; but the bitter sweet, the wistaria, the morning-glory, the cypress vine, and the bean, wind against the sun—that is, the point grows from the south to the east, and by the north and west again to the south.

about them, hilling them up a little from time to time, and sowing plaster lightly upon them until the blossoming. You may then wait confidently for your crop. Those which are unripe at the approach of severe frost should be shelled and dried in the sun or oven for after use, and light-colored ones are to be preferred for the reasons given in the former article in reference to bush beans.

The Dutch case-knife, the cranberry, the asparagus, and some others, may be used as snaps while very young; the Carolina, the white Dutch runner, the horticultural, and, above all, the large Lima for shelling. The scarlet runners are pretty flowering beans, but are not worth raising for the table.

The large Lima and the Carolina, unless in very warm soil, should not be planted earlier than between the first and second corn-hoeing, and in the richest and warmest spot; but the other kinds may be planted as early as it is safe to plant corn, which of course will vary with latitude, soil, and elevation.

BEET.

French, *Betterave*.—German, *Rothe Rübe*.—Spanish, *Remolachà*.

EARLY BLOOD TURNIP. LONG BLOOD. WHITE SUGAR OR EARLY WHITE SCARCITY. MANGEL WURTZEL OR EARLY RED SCARCITY. YELLOW SUGAR, &c., &c.

BRIEF DIRECTIONS.

Sow in deep rich soil, in drills twelve or fifteen inches apart, and about an inch deep. Thin the plants to from eight to twelve inches apart, and hoe often till the tops cover the ground.

Time for spring or summer use: at the South, through the winter months or at the earliest moment of spring; at the North, either in very late fall or very early spring.

For winter use, from the middle of June to the middle of July at the North, and at the South from the last of July to the middle or last of August.

Beets, in general, prefer a light, rich, and deep soil, although the turnip, sugar, and mangel wurtzel beets, growing mostly above ground, may be well raised upon any soil that is rich.

FORMS OF BEETS.

Fig. 75.



a. Inferior Turnip Beet.
b. Fair "
c. Better "
d. Best "

e. Worthless long Beet.
f. Inferior "
g. Fair "
h. Best "

For early use, the seed of blood turnip beet may be sown in fall or winter, or at the very first opening of spring, on extra rich ground, in rows twelve inches apart, between which early salad or radishes may be sown if saving of space be an object, these coming off before the beets require the whole ground, and the beets can be thinned by pulling the young plants for greens.

For winter, both the blood turnip and the long blood are now extensively used, the former being valued not only for its intrinsic excellence when raised properly, but also for its keeping qualities. It may be preserved in good order until June.

Long blood beets for winter use should not be sown at the North until from the middle to the end of June, and blood turnip from the first to the middle of July, and still later to the South, so timing them as to allow between three and four months for them to attain their full size. As soon as they are well up they should be thinned, the former to a foot apart each way, or fifteen inches by nine, and the latter to one foot by six inches. Keep them well hoed and the earth loose until they cover the ground with their leaves; sow a little ash compost over them once or twice during their growth, if possible just before rain; and whenever the frost even but lightly touches the tops, gather your crop immediately, or you will lose a considerable portion of its sweetness. The tops having been carefully and closely trimmed off, the roots, slightly dried, may be kept through the winter by being buried or *holed*, as hereafter directed; or in an ordinary cellar, if laid up dry, not wilted, and covered with sand or earth.

To this article a few general remarks may perhaps be profitably added.

1st. If long beets are raised for a series of years in ground that is not deeply plowed and well pulverized, and the seed saved from them is annually resown, they will become shortened in growth, or form a habit of growing much above ground, and, in consequence of the latter peculiarity, deteriorate in quality for the table.

2d. The kinds named above are the only kinds really worth raising, and, if good stock is obtained, supply all that can be desired. The color of the first two should be dark blood, but

not black, for extremely dark beets will rarely grow freely enough to possess the sweetness desirable. A dark-rooted beet with a rather light top is generally the best ; when cooked, it will be of a bright blood-color.

The mangel wurtzel, or red scarcity, is a red-skinned beet, but white inside, growing much out of the ground, and, although chiefly used for feeding cattle, makes a tolerable early beet. The white sugar, or scarcity, rather shorter, but of somewhat similar habit, having sometimes a very slight tinge of pink upon the skin, also makes a good early beet. These varieties are unfit for winter use. Of the two, the white sugar is the more desirable, being of rather better quality, and having a fine appearance when served up mixed with the blood-colored varieties.

As to yellow beets and the thousand mingled varieties that may be met with, their dull, dirty appearance when cooked is a sufficient objection to them, not one of them possessing any peculiar excellence to counterbalance this defect. No sweeter or more tender beets can be raised than of the kinds above mentioned, but no beet can be raised of fine quality unless rapidly grown. For this end, rich soil, sufficient room, and frequent hoeing are indispensable. If from any cause it grow slowly, or receive a check, as not unfrequently happens in drought and from early frosts, the taste of potash, and not sugar, will be found when it is eaten.

I have not named those beets which are raised expressly for the tops, because it appears absurd to cultivate them. One beet-top is almost as good as another, when grown luxuriantly, and if tops are wanted, they can be plucked from the rooted varieties. As a farm crop, or on a large scale for marketing, beets should be sown in rows at least two feet apart, and thinned to from six to fifteen inches in the rows, according to the kinds and the object proposed in raising them. If raised for feed, being planted early and kept well plowed and harrowed, two feet by fifteen inches will probably yield as much per acre as if left closer, and it is manifest that, other things being equal, the fewer in number the roots may be the less will be the labor of gathering them. For analysis of beets, and their value as a crop for feed, see p. 500.

Beets may be well kept through the winter by piling them carefully on a level or slightly raised surface, and covering them about a foot thick with earth, packed and sloped so as to shed rain, adding other covering in winter, if found necessary. This is called "holing." Or they may be kept in bins in the cellar; but when in small quantity, they may be packed in ordinary barrels, and either headed or covered thinly with earth, in any place where the frost does not reach.

BENE PLANT.

This is the *Sesamum Orientale* of botanists, and has, so far as I know, no other designation than bene in the French, German, and Spanish languages. Sow in a drill an inch deep; thin the plants to six or eight inches apart, and keep clean.

Time: corn-planting time. May at New York.

The bene plant is rather a medicinal herb than a garden vegetable, but its value as a palliative or remedy in summer complaint among children has given it a claim to a place in the home garden.

It is prepared by infusing the leaves or seeds for a short time in water. It thus yields a tasteless mucilaginous drink, which is said to be very useful in the complaint referred to.

BROCOLI.

French, *Brocoli*.—German, *Kohl Italianische*.—Spanish, *Brocoli*.

EARLY PURPLE CAPE. EARLY WHITE CAPE. LATE WHITE, &c., &c.

BRIEF DIRECTIONS.

Set the plants twenty inches apart, in rows two feet wide, in rich soil, and hoe often.

Time at the South: sow from August to January, and set out as soon as the plants are large enough.

New York and the North generally: sow in September, and set out in April or early in May for summer use. For fall crop, sow in the first half of May; set out in July.

There are more than forty varieties of broccoli, but the best, and perhaps the only desirable kind for us, is the "early pur-

ple cape." The early white may be worth trying, and sometimes the cauliflower is sold by this name; but the labor bestowed upon the late white is generally wasted. It is a large-growing but profitless variety.

The early purple cape is a somewhat surer crop than cauliflower, and seed of good stock is more readily obtained, but it is so far inferior that, where cauliflower can be successfully raised, it is sheer folly to plant the brocoli.

The full directions given for raising cauliflower are equally suitable for brocoli; or, for the fall planting, the latter may be treated precisely as directed for winter cabbages.

BRUSSELS SPROUTS.

French, *Chou de Bruxelles*.—German, *Sprossen Kohl*.—Spanish, *Col de tallo de Bruselas*.

If raised at all, sow and treat in all respects as directed for Savoy cabbage (which see), observing that in heeling in Brussels sprouts for winter the earth must not cover that part of the stems from which the sprouts grow.

Brussels sprouts is a species of cabbage about as hardy as the curled Savoy, which in growth it somewhat resembles. It does not form a main head, but grows up with a considerable stem, bearing at the top a pretty large bunch of leaves, of which the outer ones are quite long, declining, and coarse; the inner or crown leaves, which are much stronger flavored than the Savoy, become fit for use as greens only after the most thorough freezing.

The only valuable product of this plant consists in the mass of "sprouts," or small button-like heads, with which, in plants of good stock, the stem is thickly set, and which, being covered by the overhanging leaves, become white, and form a tender and pleasant dish when cut from under their slight covering in mid-winter, and carefully boiled in a net.

The objection on account of lack of quantity in the product, mentioned in the case of Savoy, holds still more strongly against the Brussels sprouts; neither has it any peculiar excellence to balance this and its other defects.

CABBAGE (Early, or Summer).

French, *Chou pomme*.—German, *Kopfskohl*.—Spanish, *Col*.

EARLY YORK. WAKEFIELD. KNIGHT'S EARLY. LARGE YORK.
OX-HEART. EMPEROR, ETC., ETC.

BRIEF DIRECTIONS.

Set the plants twelve or fifteen inches apart, in rows eighteen inches to two feet wide, in rich soil, and hoe often and deeply.

Time: at the North sow in September, or in hot bed last of February or first of March; set out in the last half of April.

In New York, in ordinary seasons, set out a little earlier, particularly fall-sown plants. At the South sow and set out from November to March.

It would not be worth while to enumerate the varieties of cabbage: their names are very indefinite; new varieties or sub-varieties being so readily obtained that there seems no limit to the possible number; and, as new names sometimes sell old books, so old varieties of vegetables are sometimes found under new designations for the same end, or novelty is attained by a very slight variation. But, by whatever names they may be called, four or five kinds will fill up the season's course, and complete the necessary supply of this vegetable for a family.

1. Early York, or any early cabbage, Wakefield, Knight's, etc., should be sown in September or October, and when about two inches high transplanted into a pit or cold bed about two inches apart for wintering; or they may be sown in a hot bed in the latter half of February or former part of March, and, after being hardened by gradual exposure in the beginning of April, may be set out at any time after the middle of that month in rows eighteen inches to two feet wide, at a distance of twelve or fifteen inches in the rows. Plants that have been wintered may be set out rather earlier than hot-bed plants, and will usually come off in time to sow turnips for winter use upon the ground they occupied.

2. The large York, or ox-heart, or any second cabbage, may

be sown and set out at the same time or a few days later than the former, giving them also a little more room—say sixteen inches apart by twenty-four. These will succeed the early kinds, and continue your supply until the flat Dutch, Bergen, etc., mature, whether at the North or South.

South of latitude 40° north, cabbages of the earlier or later kinds, for spring and summer use, *may* be set out in the fall as soon as the plants attain sufficient size, and where this is done, if it seem necessary, they should be set on one side of a small ridge or furrow, running the rows in such a direction that the ridge of earth will afford some protection to the plants from prevailing winter winds; strew over them a very thin covering of litter or evergreen brush, and give prompt attention to the culture of the crop at the first opening of spring.

In certain localities this process may be found desirable, but in general it is best to set out plants at such time as that they will start immediately and grow right on to their maturity.

CABBAGE (Late, or Winter).

BERGEN. FLAT DUTCH. DRUM-HEAD. RED (OR PURPLE). SAVOY, ETC., ETC.

BRIEF DIRECTIONS.

Set the plants twenty inches apart, in rows two feet or more wide, in strong rich soil. Hoe or dig among them till the leaves touch.

Time: sow in May. Set out in July in New York and the North generally, and later as you proceed south. See also directions given above under early cabbages. The Bergen, flat Dutch, drum-head, or any late cabbage, if sown and set out late, and grown rapidly by the aid of rich soil and thorough culture, will prove equal in quality to the earlier kinds.

If the red or purple cabbage is desired, it should be sown and set out a little earlier than the Bergen, etc., but at the same distances. It is valued, chiefly on account of its color and thick fleshy texture, for pickling and cole-slaw. Unless very good stock is obtained it is liable to yield only small and comparatively worthless heads, or to fail to head at all.

The Savoy is a curled cabbage, liable, as the former, to fail in heading if the stock be not good, and generally yielding a much less weight of crop than the other winter varieties, but, on account of its hardiness and marrowy excellence after being well frozen, it is worthy of more attention than it receives. It should be treated precisely as the red in respect to times of sowing, transplanting, and distances. Its form may be either globular or heart-shaped.

North of latitude 40°, late cabbages may be sown in all May, and set out in July and the first half of August. In more southern latitudes they should be sown and set out at later periods, but so as to afford them from twelve to eighteen weeks from the time of setting out to perfect their heads, which, with good culture, will be found sufficient, unless the stock be inferior.

The ground for cabbages should be rich, and, if naturally a rather moist and strong loam, the addition of sufficient manure will render it perfectly suitable for them. They will grow, however, in any deep rich soil.

Within three or four days after the plants are set out they should be carefully hoed, and every morning, until they attain strength, the cut worm should be sought and destroyed. Its hiding places may be known by the fresh-cut leaves or plants sticking out from its retreat; stir the earth a little just below the surface, near the plant, and you will find the marauder. Crush him. See also page 108.

Throughout the period of their growth keep the ground clean and loose, either with the spade and hoe or the plow and drill-harrow, and if, after each hoeing, a little poudrette or ash-compost is applied, it will materially aid the growth and improve the quality of the crop.

As a farm crop or for feed, the larger late varieties of cabbage may be planted at a distance of thirty inches each way, the ground being previously well prepared with the plow and harrow, and lightly cross-furrowed with the skeleton plow, the plant being set at the crossing. See *Analysis and Value*, p. 500.

Cabbages are liable to a disease called anbury or club-root, in which large swellings form upon the roots. These are sup-

posed to proceed from the wound of certain weevils depositing their eggs, as the gall is formed upon the oak, but I suppose the insect *seeks* only unhealthy or checked plants, diseased, morbid juices being probably agreeable to it. I have found it in the portion of a patch reached by the roots of neighboring trees; and in a seed-row sown down a slope, the plants on the lower or wet part were almost all clubbed, and the others free. For insects infesting the cabbage, see pages 99 and 104.

It is often found difficult in northern latitudes to preserve cabbages through the winter without loss by rotting, or, if this be avoided by hanging them up singly, they are apt to become tough and almost tasteless from drying or self-exhaustion.

The best known mode of wintering them is to pull them up on the appearance of hard frosts trim off the outer leaves, and, having made a deep clean furrow upon a gentle slope, begin at the upper end of it, and place the cabbages, with the heads downward, not quite perpendicularly, but sloping, so as effectually to discharge or shed water from the heads. Having thus arranged your heads, with the roots uppermost, throughout the length of your furrow, proceed either with the plow or spade to cover them with earth, forming a ridge over them a few inches thick; still farther to secure them against water, make the crown of the ridge as solid as possible by beating or treading along it, and finish it up sharply. Whatever may be needed for winter use can be broken out, beginning at the lower end, while those which remain will come out in the spring, even as late as May, as fresh and almost as sound as when put in.

The red cabbage and the Savoy, being hardier, do not require this covering, but may be "heeled in" at the approach of winter by setting the roots in an opened furrow or trench, and placing the heads close together, but above the ground, and carefully settling the earth around the necks; cover them lightly with straw or evergreen brush, and cut them out as required for use.

Merely for winter cooking, the other varieties may be kept in the same manner; but if you desire them for spring use the former mode is preferable. The "sauer-kraut," of which Ger-

mans are so fond, is made by halving fine solid cabbage-heads lengthwise, cutting out the stem, and shredding them as for "cole-slaw," but perhaps still finer. This is usually done by means of a gang of from three to six knives arranged obliquely across a wooden frame, the best and freest cutters being grooved lengthwise like scythe-blades. Within this frame a small open box for the half cabbage-head runs, the operator pressing the cabbage upon the knives as he drives the box. The shredded cabbage is then packed as closely as possible, by the aid of a wooden "pounder," into a keg or barrel, with a moderate salting, and spicing with caraway or other aromatic seeds, &c. When finished, a cloth is laid over it, and the head or other cover laid upon it, with a weight, until it has fermented and all impurities are cleared off. It is then ready for use, and may be headed up for winter, keeping it carefully covered with its brine, as in preserving pickles or butter, &c.

CARDOON.

French, *Cardon*.—German, *Kardoner*.—Spanish, *Cardon*.

If raised at all, sow in a single row where they may stand to mature, having plenty of room, at least two feet on each side, and when well up, thin the plants to fifteen inches apart.

Time : March or April.

The cardoon resembles the artichoke (see p. 114), but the heads are not used, the scales being fleshless and bitter. When the plants are full grown, before the flower-stem starts, the leaves, being gathered upright and bound together, are earthed up, like celery, to blanch, and when this is effected, the leaf-stems are used by those who fancy them in stews, &c.

CARROT.

French, *Carrotte*.—German, *Möhre*.—Spanish, *Zanahoria*.

EARLY HORN. LONG ORANGE. ALTRINGHAM. LONG PURPLE, OR BLOOD. LONG WHITE, &c.

BRIEF DIRECTIONS.

Sow in shallow drills fifteen inches apart ; cover lightly, and

if dry give water. Thin the plants to three or four inches distance, and keep clear of weeds.

Time: for winter use in families, the first half of June is the best time to sow carrots in New York and the North generally, and still later in the South.

FORMS OF CARROTS.

Fig. 76.



- a. Inferior early Carrot.
- b. Good early Carrot.
- c. Inferior long Carrot.
- d. Better long Carrot.

- e. Best long Carrot.
- f. White long field Carrot, of poor quality, but easily gathered.

The two first named above are the only kinds desirable for garden culture. The early horn is a short root, calculated for

the very earliest summer use. It should be sown at the first opening of the spring, in rows half an inch deep, about one foot apart, and, if the weather prove dry, water lightly until the plants come up. Hoe and keep clean, thinning to two or three inches, and drawing out for use as fast as they swell.

The long orange, when of a very dark orange color (see Color, p. 71), is the best of all carrots, and though not perhaps always yielding so heavy crops as some of the coarser varieties, it may fairly be doubted if its superior quality does not render it, upon the whole, more desirable than those varieties, even for farm culture.

It may be sown about the last of May or in the first half of June, in the same manner as the former, the young plants being thinned to four inches apart.

Among market-gardeners around New York and south of it, carrots are also sown later and wintered out, being lightly covered with straw, or salt hay, or evergreens. In this state they remain uninjured through the winter, and, starting to grow early, afford carrots that can be bunched in May, and really furnish fresher-flavored roots than those which have been stored.

A light, warm, and not very rich soil is suitable for carrots, but good crops may be raised upon any soil deepened by good culture and moderately manured.

In the vicinity of large cities land is sometimes made too rich for this crop, and it fails entirely.

If raised as a farm crop, carrots should be sown in rows two feet wide, being thinned to four inches apart in the row, and kept free from weeds. Plow often and deeply until they are about half grown, then run the skeleton plow once beam-deep between the rows; follow it with the light drill-harrow, and the culture of your crop is completed.

Carrot-seed imported from Europe is generally very troublesome to sow, unless thoroughly rubbed with earth, or ashes, or plaster. It is very woolly, and can scarcely be separated. American seed, if properly managed, is clean and free as other ordinary seeds. See *Analysis and Value of Carrots*, p. 500.

In addition to the common uses of carrots, they make excellent "pumpkin pies." For this purpose they should be passed

through a fine grater, either in their raw state or stewed, and then be used precisely as veritable pumpkin.

CAULIFLOWER.

French, *Chou-fleur*.—German, *Blumenkohl*.—Spanish, *Coliflor*.

EARLY, LATE, ETC.

BRIEF DIRECTIONS.

Set the plants twenty inches apart, in rows two feet wide, in very rich soil, and hoe often.

Time: for spring and summer heading, sow in September; pot and protect the plants carefully through winter, and set out in April or May at the North; but at the South sow a month or more later, and either pot and protect them thus, or set out the plants, when four or six inches high, where they are to stand through winter, and protect them if necessary.

For the fall crop at New York and the North generally, sow in the first half of May, and set out last of June or first week of July. Proceeding southward, sow and transplant still later, allowing the crop full sixteen weeks from the setting out, with good culture, to mature for use before winter.

The cauliflower, like the brocoli, is of the cabbage tribe, having long, narrowish leaves, which grow upon the stem rather in the fashion of a tuft, somewhat as the palm-tree bears its leaves; and, instead of having a head like the cabbage, formed of the young leaves compacted by the closing of those above and the growth of those within, it is composed of the incipient blossom-head, which, appearing at first as a mere button in the centre of the crown of leaves, gradually enlarges to a diameter of from six to twelve inches or more. When in perfection it has the appearance of a compact curd-white mass of an irregular convex form, and is the most choice and delicate of garden vegetables.

The early cauliflower is on many accounts preferable to the other varieties, and perhaps is the only one that will prove to be really worth raising. Between the early and late varieties of cabbages, peas, etc., their time of maturing affords a pretty

clear distinction ; but it is scarcely so with cauliflower, which is rather finer and coarser, good and inferior, and by the initiated the terms early and late are used in reference to the period of the expected crop, as summer or fall, rather than to designate different varieties. Disappointments would be still more frequent to the cultivator if the seed for both were not often furnished from the same stock by the seedsman.

If desired for summer use at the North, the seed should be sown about the middle of September, and the plants, when about three inches high, transplanted into quart garden-pots, three plants in a pot, and placed in a pit for wintering. They should be kept well covered in the severest weather, but when a moderate temperature prevails light and air should be given.

In the latter half of April the plants may be set out in very rich, strong soil, at the distance of twenty inches by two feet, or two feet each way. Let them be often and deeply hoed, and dig or plow deeply between them at least once before they attain their growth ; use ash compost or liquid manure about them from time to time, and if the season is favorable you may cut fine heads for summer use ; if, however, the season prove hot and dry, the heads will probably be small and of only medium quality, or you may be entirely disappointed of a crop.

In milder latitudes they will bear the winter with little or no covering, and may be set out in late fall.

The fall crop is far more certain, and more easily raised.

For this, sow the seed in the spring, at the times above directed ; transplant when two inches high into a second bed, two or three inches apart. In about six or seven weeks from the sowing, set them out at the distance named for the summer crop, treat them as directed for the same, and, unless the seed sown was of inferior stock, you may ordinarily calculate on a full and valuable crop.

If, on the approach of winter, any part of them have not perfected their heads, let them be taken up carefully, with plenty of earth to them, and heeled in closely, either under the bench of a green-house or in a warm dirt cellar, and they will continue to head almost as well as in the open ground.

The proper time for cutting cauliflower is when the head has

attained its largest diameter, but before it gives any indications of becoming loose or open.

For the benefit of the cook and the consumer, I remark that it should never be boiled with other vegetables or with meat, but in fair water, or milk and water, with a little salt, being careful not to overcook it—say boiling it twenty minutes or less. A bag-net, which is useful in boiling all green vegetables, will be found especially so in cooking cauliflower. It may be eaten with drawn butter or gravy, as fancy dictates.

The imperfect heads of both cauliflower and brocoli, or the full heads divided for the purpose, make handsome and pleasant pickles. See page 167.

It is often difficult to obtain cauliflower seed of good stock, and upon this almost every thing depends; but where good stock can be obtained, and the soil is favorable, there are few garden crops more profitable.

CELERY.

French, *Celeri*.—German, *Sellerie*.—Spanish, *Apio*.

WHITE SOLID. RED GIANT.

BRIEF DIRECTIONS.

Sow upon the surface of very light, rich soil, and rake lightly in. Keep watered and shaded from the strong sunshine. When the plants are three or four inches high, prepare trenches two to four feet apart, a foot wide, and a foot deep; dig into the bottom plenty of rotten manure, and set the plants six to eight inches apart, a single row in each trench. Continue to shade them until started, and gradually earth them up as they grow.

Time: sow from March to May. Set out from May to July in New York and the North generally.

At the South, sow in June and July. Set out in August and September.

There are various kinds of fancy celery, and diversities of opinion as to their merits, but the continued general cultivation of the white solid would seem to prove that, on the whole,

it is the best. The term *solid* as applied to celery refers to the leaf-stem or eatable part, which, in inferior varieties, is more or less hollow, or "piped." Celery should be sown upon the surface of fine, light soil. The seed, being raked in very lightly, should be shaded for a few days, and watered moderately each *evening* until it comes up, if the weather be dry. When about two inches high, the plants should be transplanted into a second bed at one or two inches apart. In May and later, prepare for their final planting by digging trenches about a foot wide and ten or twelve inches deep at a distance of three or four feet apart. Strew along the bottom a thick layer of thoroughly rotted manure, and dig it in, mixing it well with the soil in the process. After it has lain a week or two, dig it again, and mix and pulverize it. If your plants are ready, or you desire something a little earlier than your main crop, you may begin to plant; if not, then dig again when your plants are ready, and, having grouted the roots (see p. 88), set them out at six or eight inches apart, in a single row along the trench, and shade them until they take root. Keep them perfectly clean, and the earth loose around them, applying liquid manure after each hoeing until they are large enough to earth up for blanching.*

This process should be performed about every ten days after the plants in the trenches have attained a height of ten or twelve inches.

To do this properly, choose a fine day for the operation, gather the leaves carefully up, place a board on each side of the row, and draw the earth against them; then raise the boards gradually, and carefully settle the earth to the plants.

At the approach of winter take up your celery, which should now be from eighteen inches to three feet high, remove any waste leaves, and especially such as may be decaying or touched by frost, and pack it away in earth or sand in a cool cellar

* Blanching is effected by the exclusion of light, which seems, in general, essential to the development of color. The law, however, is not absolute, for seed-leaves are often found in the common field-pumpkin and in ripe cucumbers which have grown nearly to their natural size and of a fine deep green color.

or out-house where frost will not reach it, or set it upright in a narrow bed out of doors, packing it closely, yet so as to admit the earth through it, and, having ridged it over somewhat carefully, to prevent water settling into it, cover the whole with straw or mulch of any kind sufficient to prevent the frost from closing it against you during winter. Like all green vegetables for winter use, celery will keep better in the open air than housed, if proper precautions are used for its protection against frost.

It is not uncommon to plant celery in very moist ground for the sake of a luxuriant growth, but in this there is danger of partial decay in wet seasons, and always loss of quality. Celery of the finest flavor, though not of the largest size, is raised in light, dry soil.

CELERIAC is a turnip-rooted variety of celery used in soups, and but of little value. It is raised and may be kept as turnip-beets. See page 120.

CHERVIL.

French, *Cerfeuil*.—German, *Gartenkerbel*.—Spanish, *Perifolio*.

Sown and treated as parsley, which see, page 160. It is an aromatic herb, sometimes used in soups and salads.

CITRON.

French, *Citronne*.—German, *Citron Wasser Melone*.—Spanish, *Melon de agua de Cidra*.

See WATERMELON, page 152.

CIVES OR CHIVES.

French, *Civette* or *Ciboulette*.—German, *Binsenlauch*. *Schnidlauch*.—Spanish, *Cebollinos*.

Cives should be set out in August or September at the North, or November or December at the South, at about six inches apart, and two or three inches deep, either in a single row, or small bed, if beds are preferred, where they can remain permanently; or they may be set as edging to paths.

They are a very small species of onion, increasing from the root, with leaves not thicker than straws, starting up very early in the spring, when the young tops are cut and eaten.

CORN.

French, *Mais*.—German, *Korn*.—Spanish, *Maiz*.

1. CANADA. 2. SUGAR. 3. TUSCARORA.

BRIEF DIRECTIONS.

Plant in rich, warm soil, in hills three feet apart, five grains in a hill, an inch deep. When well up, thin to the three or four best plants. Hoe often, and dress with ashes and plaster.

Time: from March to July, according to latitude, and the earlier or later period at which the crop is desired for use.

All the varieties of corn may be raised in the garden for roasting ears or green corn. I have placed the kinds named above in the usual order of their ripening, though this varies with stock, but remark that the Canada, as is common with extra early vegetables, is small. The sugar, with high manuring, may be raised of fair size, and is of superior sweetness. It may also be kept for winter cooking, either by being hung up in bunches by the tips of the husks, or husked and shelled while soft, and gradually dried in an oven at a moderate heat.

The Tuscarora has no flint, being what is called a flour corn. It yields a fine large ear with a red cob, which slightly discolours it in boiling. Perhaps the first two may be esteemed the very best for family use, or we may add the common eight-rowed white.

Corn should be planted in very rich soil at various times along through the season, in hills three feet apart each way, carefully thinning it at the first hoeing to the three or four strongest plants. Use ash compost from time to time upon them, and gradually but moderately hill up.

In its farm culture corn should be planted at about the distances named, and in the course of its early growth should be plowed at least three times each way, giving it two careful hoeings, each followed with a top-dressing of plaster or ash compost, and a final "hilling" after the third plowing.

For analysis and value, see page 500.

CORN SALAD OR FETTICUS.

French, *Mâche*.—German, *Ackersalat*.—Spanish, *Mâche*.

Sown and treated precisely as spinach, except that thinning the plants is not essential (see SPINACH, page 179).

It is a soft, mild salad plant, of no great account, but used with or instead of other salads in the early spring, when almost any thing green finds a welcome. "Lamb's lettuce" is its most appropriate synonym.

CUCUMBER.

French, *Concombre*.—German, *Gurke*.—Spanish, *Pepino*. *Cohambro*.

1. EARLY CLUSTER. 2. SHORT GREEN. 3. LONG GREEN
(*white spined*).
4. EARLY FRAME. 5. EXTRA LONG.
6. WHITE TURKEY.

BRIEF DIRECTIONS.

Plant in very rich, warm soil, in hills four to six feet apart, six or eight seeds in a hill, an inch deep. When well up, thin to the three best plants. Hoe often till the vines touch.

Time: from February to August, according to latitude and the object for which the crop is raised. The main crop every where may be planted at the time of principal corn-planting, or a little later. The pickle crop in June and July at the North; at the South, in August or September.

The varieties of cucumber, like those of cabbage, are so numerous, and often so similar, that none but a professional gardener or a curious amateur would be able to distinguish them from one another, or even think it worth while to keep the record of their names.

The first three given above may be considered as including the useful varieties, and the three last as chiefly fanciful.

The early cluster is a small, short, dumpy variety, with which most persons are familiar, from its abundance in our markets in the fall. It is of pleasant flavor, but seedy, and is valuable chiefly on account of its earliness, and, to those who raise pickles for sale, from its great capacity for bearing.

The short green is a common table cucumber, also sometimes

raised for pickles, rather longer than the cluster, and of about the same quality, but not so profuse a bearer.

The white-spined long green supplies a desideratum among cultivators, being of very handsome form and deep green color, free from bitterness, and an abundant bearer. It is sometimes called simply the white-spined cucumber, but its varieties are increasing, and are easily distinguishable. Its quality can not be fairly judged of by those purchased in our markets, as it may be cut too late or kept for a week without materially changing its color.

The early frame is of no particular variety, but the name covers a number of slightly differing sub-varieties, which are used for planting in frames in winter for the production of cucumbers at unseasonable times.

The extra long is, on various accounts, not worth cultivation. Very long cucumbers are more solid in texture than is desirable, and the stem end is generally bitter for two or three inches. If the peeling be performed from that end, the bitterness is more or less communicated to the whole, and hence probably the old rule, always to peel a cucumber from the blossom end. They are also, in general, poor bearers; but their fine appearance, either for pickles or the table, has given them considerable favor in certain quarters.

The "white Turkey" is a curious but valueless variety.

Small cucumbers of any kind, when pickled, are properly called "gherkins," but this name has been also given to a very small, seedy, worthless, burr-like West Indian cucumber, of which poor pickles are sometimes made.

Cucumbers should be planted in the richest soil, in hills from four to six feet apart, six or eight seeds in a hill, at about an inch in depth, and at the first or second hoeing only the three strongest and healthiest plants should be left. Frequent and deep hoeings, continued until prevented by the interlocking vines, and gradual hilling up of the plants to the seed-leaves, with the application of ash compost to the hills from time to time after hoeing, will suffice in ordinary seasons to secure a satisfactory crop. If planted in large patches, the ground, having been prepared by thorough manuring and repeated plow-

ings, should be furrowed both ways at four feet distance, the seeds being dropped at the crossing and carefully covered. They should be well plowed both ways at least twice during their growth, and treated in other respects as above directed for their garden culture.

DOCK, COMMON YELLOW.

French, *Rumex*.—German, *Ampferkraut*.—Spanish, *Bardana*.

A row or two of the common lance-leaved or yellow dock, sown on very rich soil, at the same time as parsley or parsnep, will yield early greens in abundance for those who esteem them.

When rapidly grown, they are as tender and pleasant as any others, and probably still more decidedly healthful for spring use. When the season for their use as greens is past, the root may be dried for the purposes of domestic medicine, or for sale to the manufacturers of "extract of sarsaparilla," into which it is said to enter largely.

The English Patience dock, a native of Italy, known among the French as *Rhubarbe des Moines*, is in no respect materially better than the above.

EGG-PLANT.

French, *Melongene*.—German, *Tollapfel*.—Spanish, *Berenjena*.

1. LARGE PURPLE. 2. WHITE.

BRIEF DIRECTIONS.

Set out in a very rich, warm soil, in hills three feet by two apart, two or three plants in a hill. Hoe often, and hill up gradually until they blossom.

Time: sow in hot bed six or eight weeks before corn-planting time. In about four weeks thin them carefully, or transplant the whole into a second bed or into pots (see p. 87). Set them out just before the time for first corn-hoeing.

If practicable, let the whole of your plants be transplanted into a second bed at two inches apart, or into small pots, three plants in a pot. At the proper time turn them carefully out

of the pots, without breaking the ball of earth, or, if not potted, transplant into hills three feet by two, in **very** rich, warm soil. Hoe them often, and apply liquid manure from time to time.

When the fruit seems to have attained about three fourths of its size, and before it begins to lose its deep purple color, it is ready for use.

The purple egg-plant is a rich and valuable esculent, often growing to the size of an ordinary muskmelon, and when thinly sliced and well cooked by frying in good butter, or lard, in which it cooks more readily, deserves even a better name than that of "beefsteak plant." It is also called by some "Guinea squash." The white is merely ornamental, or, rather, simply curious.

ENDIVE.

French, *Chicorée*.—German, *Endivie*.—Spanish, *Chicoria*.

GREEN CURLED, &c.

BRIEF DIRECTIONS.

Time: sow from February to April for summer use, and from June to August for fall and winter, and set out and cultivate as lettuce. See p. 148.

At the South it may be sown and set out still later.

The endive is a handsomely curled plant, resembling the Si-lesian lettuce in its habit, but of a strong and bitter flavor. It is chiefly used as a fall and winter salad, but also for garnishing, and sometimes in stews.

It is rendered milder by blanching, which is effected by gathering the whole of the leaves upright, and tying them closely together near the point, two or three weeks before it is cut for use, or by placing over the heads earthen pans or saucers, which are made by the potters for this purpose, like dish-covers, with a small knob upon them. The broad-leaved or Batavian endive is a plainer-leaved and coarser variety than the curled.

GARLIC.

French, *Ail*.—German, *Knoblauch*.—Spanish, *Ajo*.

Garlic sets should be planted in the fall or spring, at the same time and in the same manner as onion sets, at a depth of two or three inches. Keep them clean until the changing color of the tops shows the roots are ripening, then take them up and dry them for use. The sets are obtained by dividing the clustered roots which are sold in our stores and markets.

Garlic is a bulb of the onion tribe, very strong, and to many persons very offensive, but often used medicinally and in French cookery.

Rocambole, or Spanish garlic, is a milder variety, cultivated in the same manner and for the same uses.

GREENS.

Greens are either young plants raised in the fall, and wintered expressly for early cutting, as spinach, German kale, &c., or they are similar young plants raised in the spring for the same purpose, as spinach, cabbage, mustard, &c., or they are the first young spring growth of roots or stems wintered for the purpose of producing them, as kale, cabbage, dock, &c. Though very unsubstantial, they are eagerly sought in the early spring. What they lack as food they perhaps make up as physic, many of them being, in medical parlance, "laxative and detergent." A little saleratus added to the water in boiling them renders them in general safer and better for use. It should not be omitted, especially in cooking poke-weed and others of doubtful reputation.

Most of them will be found in their alphabetical order, but, for convenient reference, a list is given below from which selections may be made.

1. BEETS. The part used is the young plant entire, pulled and washed; or the leaves may be pulled from older plants.
2. BRUSSELS SPROUTS. The young fall and spring growth.
3. CABBAGES. Young or non-heading plants of the early kinds called "coleworts" or "collards."
4. DOCK. The young spring growth.

5. HORSERADISH. The young leaves.
6. KALE, or BORECOLE. The fall and spring growth.
7. KALE, GERMAN. The young fall-sown plants cut in spring.
8. MUSTARD. The young plants raised and cut in spring.
9. POKE-WEED. The young shoots in spring, before any redness appears on them; though some use them until the leaves become large.
10. PURSLANE. The young plants cut in spring and summer.
11. RADISHES. The young plants, or tops, cut in spring.
12. RAPE, or COLEWORT. The young plants cut in spring.
13. SALSAFY. The young growth in spring, cut when four or five inches high.
14. SPINACH. The young plants of fall or spring growth, cut.
15. TURNIP-TOPS. The young spring growth from last year's roots.

HERBS.

The following list of herbs comprises some that are not very valuable, but is given in order that selections may be readily made. Some are omitted because universally known, or found wild, or worthless. Those marked with a * are inserted, with directions for their culture, in their alphabetical order in this work.

1. BURNET. French, *Petite Pimpernelle*; German, *Pimpernelle*; Spanish, *Pimperlén*.

An aromatic herb, of pretty foliage, occasionally used in salads. Formerly it was infused in drinks which some good-wives mingled for their husbands. It may be sown and treated as parsley. Page 160.

2. CARAWAY. French, *Carvi*; German, *Kümmel*; Spanish, *Alcaravea*.

3. CORIANDER. French, *Coriandre*; German, *Koriander*; Spanish, *Celanro*.

These are herbs bearing aromatic seeds, which are used in sweet-cake, etc. The plant of coriander has an offensive smell. They may be sown and treated as summer savory. Page 181.

4. DILL. French, *L'Aneth* ; German, *Dill* ; Spanish, *Eneldo*.

5. FENNEL. French, *L'Aneth doux* ; German, *Dill Kraut* ; Spanish, *Hinojo*.

Dill and fennel are aromatic herbs which are sometimes used in fish sauces, etc., and their seeds substituted for anise-seed in domestic medicine.

6. LAVENDER. French, *Lavande* ; German, *Spiklavandel* ; Spanish, *Espliego*.

A small woody plant, bearing short spike flowers of fine fragrance, raised from seeds or cuttings. See page 469.

7. LEMON BALM. French, *Mélisse* ; German, *Melisse* ; Spanish, *Melissa*.

Used for making tea, which is given in colds, etc., as a sudorific. It is raised as summer savory. Page 181.

8. MARIGOLD (Pot, or Soup). French, *Souci de Jardin*. *Marigold* ; German, *Ringelblume* ; Spanish, *Clumeno*.

The flower-leaves of pot marigold, like those of saffron, are gathered and dried for use in soups, and in domestic medicine, particularly for tea in measles. Both may be raised as sage or summer savory. Page 181.

9.* PARSLEY. Page 160.

10.* ROQUETTE. See Pepper-grass. Page 166.

11. ROSEMARY. French, *Romarin* ; German, *Rosmarin* ; Spanish, *Romaro*.

A fragrant woody plant raised from seed, as sage, or from slip or common cuttings. Page 438. It is used as a domestic perfume, and also distilled for its essential oil.

12. SAFFRON. French, *Safran* ; German, *Safran* ; Spanish, *Azafran*.

For its uses and culture, see Marigold, above.

13.* SAGE. Page 176.

14.* SOREL. Page 178.

15.* SUMMER SAVORY. Page 181.

16.* SWEET BASIL. Page 182.

17.* SWEET MARJORAM. Page 182.

18.* THYME. Page 183.

HOP.

French, *Houblon*.—German, *Hopfen*.—Spanish, *Hombrecillo*.

The hop is a wild perennial plant, whose usefulness has introduced it into every garden. It forms a pleasant summer shade when a few strings or rods are laid for it to run upon; or it may be planted by a tall single pole, up which it will run rapidly, always throwing to the surface its clustered strobil-formed inflorescence, which is known to us as hops.

They should be carefully gathered and dried before frost touches them.

In household economy they are used for making yeast, "turnpike," etc., etc. Scalded and applied in flannel as a poultice or fomentation, they constitute an excellent anodyne, and in the form of hop-tea are one of the best of tonics.

In making new plantings, choose the young *white* runners in preference to the brown old growth, and small rather than large roots, and only from fertile plants. See page 74.

The green leaves of the peach-tree are sometimes substituted for the hop in making yeast, though, from their poisonous character, it would seem scarcely safe to use them for such a purpose. The scaly ament, or "hop" of the *Ptelea Trifoliata*, a wild tree, or, rather, large shrub, sometimes called the "hop-tree," is also used for this purpose in the ordinary manner of hops, and by some is thought to be of superior strength.

HORSERADISH.

French, *Le Grand Raifort*.—German, *Merrettig*.—Spanish, *Rabano*.

Horseradish is commonly raised either from the crowns of plants or from pieces of the root an inch or two long. These should be planted in rich and rather moist soil as early as possible in the spring, from twelve to fifteen inches deep, in rows two feet wide, and from six to ten inches apart in the row. Keep them clean and well hoed, or plow and hoe until they are well started, and they will soon obtain such possession of the spot that it will be difficult to eradicate them. Whenever the root is large enough it is fit for use. It may also be raised from seed, but the mode above directed is preferable.

KALE OR BORECOLE.

French, *Chou Vert*.—German, *Grüne Kohl*.—Spanish, *Breton sin Cabeza*.

GREEN CURLED. PURPLE CURLED.

Kale, or borecole, if raised at all, should be sown and treated precisely as winter cabbage.

It is a species of cabbage that does not head, but grows up with a considerable mass of leaves, which are very much curled. It is very hardy, enduring the rigors of the severest winter with a slight covering, and in the spring its young sprouts are used for greens. See Greens, page 143.

It is much used by some northern nations as an ingredient in a kind of soup, particularly the green variety.

It is a rank, coarse vegetable, that is utterly unfit to use until thorough freezing has destroyed a portion of its acrid strength, and is only fit for regions where no other cabbage can be successfully raised or wintered.

There is a dwarf and less curled variety, largely used as greens among the German residents of our cities, and known as German Kale. It is sown thickly, in September, in drills a foot apart, and, being kept clean through the fall, with a very slight covering of litter or evergreen brush, and sometimes without any covering, stands through the winter, and in the spring, after it has grown a few inches, the whole plant is cut up for use.

KOHL RABI, OR TURNIP CABBAGE.

French, *Chou Navet*.—German, *Kohl Rabi*. *Über Erde Kohl Rabi*.—Spanish, *Col de Rabi*.

This, like the former, if raised at all, should be sown and treated in its cultivation as winter cabbage, which see, page 128.

It is properly a turnip mounted upon a stem, or, rather, formed by the enlargement of the stem near its crown, the leaves which form the crown of the plant being thrown out immediately above and partially upon the swelling which forms the edible product.

It is somewhat curious, from the combination in appearance and flavor of the cabbage and turnip, but is really not worth raising, though becoming common in our markets from the demand for it among our German people, to whom it seems as a memorial of "fatherland."

LEEK.

French, *Porreau*.—German, *Porro*.—Spanish, *Puerro*.

SCOTCH, LONDON, &c. (name not material).

BRIEF DIRECTIONS.

Sow thinly in shallow drills fifteen inches apart, in rich soil; cover lightly, and if dry, give water. When from four to eight inches high, thin them carefully to six inches apart in the row. Keep them clean with frequent hoeings, and gradually earth up to blanch and sweeten them.

Time: sow at the earliest opening of spring, and thin or transplant as above directed. At the South a second sowing may be made in early fall, treating the plants in the same manner.

The plants obtained by thinning may be set out in well-prepared drills or furrows three or four inches deep, and if carefully hoed and earthed up as above directed, will grow large and fine for their appropriate uses in soups, &c., in winter and spring.

The leek is a perfectly hardy species of onion, with a rather broad flag leaf, and swelling but slightly, the neck formed by the leaf-sheaths being its chief product for use.

LETTUCE.

French, *Laitue*.—German, *Gartensalat*.—Spanish, *Lechuga*.

1. IMPERIAL ICE-HEAD. 2. SILESIAN. 3. WHITE CABBAGE.
4. CURLED INDIA. 5. TENNIS BALL. 6. GREEN HEAD.

BRIEF DIRECTIONS.

Sow thinly in very shallow drills, a foot apart, in your richest soil. Cover lightly, and if dry, give water. For head salad

thin or transplant them to nine inches or a foot apart, and hoe often.

Time : at the very earliest moment in spring, whether North or South, in the open ground or hot bed. They may be again sown in early fall for use before winter ; and again, alone or with spinach, later in the season to winter out, or for winter lettuce under glass in a cold bed, which may be banked with stable manure if necessary to forward them.

Though there is a wide field for selection among the innumerable varieties of lettuce, yet the first three numbered above will be found adequate to the supply of all reasonable demands, and are decidedly superior to most others.

There are unexplained peculiarities about the seed and plant of the lettuce which afford valuable means of judging of its character. Varieties that are so milky and bitter as to be almost valueless as salads, except to persons of a bitter fancy, are almost invariably of a reddish or dark-brown color, and usually, if not always, have black seed. If the seed, therefore, be black, you may infer that the lettuce is more or less bitter, whatever its color may be ; and if the color be reddish or dark brown, the same inference may be drawn, whatever the appearance of the seed. This defect may, however, be overcome by blanching the heads of such varieties, which is effected either by gathering the leaves into an upright position, and tying them up, or by covering them with pans as directed for endive, page 142.

There are two very distinct classes of lettuce : the soft or tender-leaved, and the crisp or brittle.

What are sometimes called *coss* lettuces, of which No. 1 is the best known variety, belong to the latter class, and the Silesian and white cabbage to the former.

The imperial ice-head, when of good stock, sometimes grows larger than an ordinary summer cabbage, is of excellent flavor, and of glass-like brittleness.

The Silesian or yellow curled, and the curled India, with high cultivation, will grow nearly as large, are of good quality, handsomely curled, and very tender.

These may be sown in hot bed before spring opens, and transplanted as soon as practicable, or they may be sown in shallow drills in the open ground as early as it is possible to prepare it.

They should be sown or planted in rich soil, and be thinned as they grow by cutting for use or hoeing out, until the plants left to form the main crop stand from nine inches to a foot apart each way. Let the hoeing be frequent and thorough, and while the plants are small, sow ash compost upon them, or water them with liquid manure, and early in the summer they will yield you fine and excellent head lettuce.

The white cabbage lettuce is chiefly valuable for its hardiness. It may be sown in the fall in alternate rows with spinach, and the same slight covering will protect them both through the winter; and in the spring, after the spinach is cut, it will afford a lettuce crop of fair quality. Or the plants may be set in a cold bed in the fall, and by the aid of glass and a lining of stable manure in March they may be brought to perfection still earlier. The tennis ball is not a large lettuce, but heads firmly, and with some is a favorite.

The green head, genuine, is a good though not first-class lettuce, somewhat hardy, and heading freely if of good stock; but the name, being indefinite, is often applied to different kinds of green lettuces.

MELONS.

MUSKMELON.

French, *Melon*.—German, *Melone*.—Spanish, *Melon*.

1. GREEN CITRON. PERSIAN. SKILLMAN'S. 2. NUTMEG. 3.
- CANTALUPE.

BRIEF DIRECTIONS.

Plant in very rich warm soil, in hills four to six feet apart, six or eight seeds in a hill, an inch deep. When well up, thin to the three best plants. Hoe often till the vines touch.

Time: throughout the time of planting the main crop of corn both South and North. In regions so cool as to render it a doubtful crop, the seeds should be planted in pots in a hot

bed about a month ahead, and the plants set out in the hills at the time of first corn-hoeing, and, if necessary, covered with hand-glasses. See pages 35 and 508.

Muskmelons, like all other vegetable productions that can easily be varied by culture or neglect, have multiplied names; but the green citron, under some one of its many synonyms or sub-varieties, is the only kind that it seems desirable to raise. It is a netted, green-fleshed variety, regularly fluted, or, as it is called, quartered, usually sub-globular in shape, but sometimes varying almost to the cheese form. It is well known in our markets, and its form and appearance, once seen, will always be remembered. Its quality, when of good stock and well raised, can not be surpassed.

No. 2 derived its name from the almost perfect similarity of its form to that of a nutmeg, and, when first introduced, was a melon of excellent quality; but, by the carelessness or ignorance of cultivators, it has been spoiled by intermixture with cucumber or pumpkin, and was superseded years ago by No. 1. I notice it only because the green citron or Persian is sometimes erroneously called "nutmeg," from old association.

No. 3, originally good, but not first-rate, includes all those large mongrel varieties that are generally longish, smooth, and yellow inside and out. They used to be eaten with the addition of sugar, or pepper and salt, according to taste or lack of taste; and, as Dr. Johnson said of the haggis, may be "pretty good for hogs." It is mentioned only because the thing and the name still lingers in certain districts among the relics of the past.

Muskmelons of the best quality are raised in rich and rather light loam; they should be planted in hills four or five feet apart each way, and treated in their culture precisely as cucumbers, *which see*.

Melons are often gathered unseasonably, and are then necessarily inferior. When fit for gathering, a glance at the stem where it is set on to the fruit will show either a small quantity of molasses-like juice exuding, or a slight cracking of the connection between the stem and the fruit, and, on taking the fruit

in the hand, it will be found to separate readily from the stem. No melon to which the stem adheres, or from which it has been separated by force or by the knife, is worth eating.

The melon-patch should be looked over every day about noon, and the fruit then gathered be kept to cool and mature for next day's use. If, from previous neglect, the fruit is becoming yellow, it should be cooled and eaten the same day. It is a cooling and slightly restringent fruit, and, if ripe and fresh, can not be eaten to excess.

WATERMELON.

French, *Melon d'eau*.—German, *Wasser-melone*.—Spanish, *Melon de agua*.

CAROLINA. SPANISH. LONG ISLAND. EARLY APPLE-SEED.
ORANGE. CITRON, &c.

BRIEF DIRECTIONS.

Plant in hills six feet apart, enriched with compost, or in very rich warm soil, five or six seeds in a hill, an inch deep. When well up, thin to the three best plants. Hoe often, gradually hilling up until the vines touch, and after the young fruit appears cut off the extreme ends of the most luxuriant shoots.

Time: about ten days after corn-planting.

There is not much variety in the character of ordinary watermelons, except as they may be adapted to or affected by the climate in which they are raised. Fruits essentially Southern can not be expected to attain perfection in a northern latitude.

Of the above named kinds, it is better, therefore, at the North to choose the Long Island or the early apple-seeded varieties than to risk disappointment by planting those which in suitable locations would grow larger and richer.

The orange watermelon is a recent variety, of excellent quality and peculiar habit, the inside of the fruit separating readily from the rind like an orange, whence its name.

The "citron" is almost solid and tasteless, and is used only for making preserves—a mere vehicle for the exhibition of sugar and various flavorings.

Their culture is the same as for cucumber, *which see*.

MUSHROOMS.

French, *Champignon comestible*.—German, *Essbare Blätterschamme*.—Spanish, *Seta*.

The mushroom is a plant of the fungus family, which is abundantly produced in our old pastures when a dry summer is followed by a rather moist and warm fall. They may also be raised from what is known as "mushroom spawn." This is composed of loam, cut straw, and the fresh droppings of dry-fed and highly-kept horses, in which the spores or invisible seeds of the mushroom have been caused to germinate by gentle fermentation in a dry place, producing a minute, white, tubercular or thread-like growth throughout the mass. The ordinary process is first to work the whole into the condition of thick mortar or potters' clay, which the cut straw is used to bind together, after which it is formed into small bricks, into each of which a piece of old "spawn" is inserted as leaven. The bricks, being then carefully piled upon a layer of stable manure, are covered with enough of the same to induce a moderate warmth in the mass. When the bricks, on being broken, show that the spawn introduced or developed has spread through them, they are thoroughly dried, and in this state will keep good for several years. This is the "mushroom spawn" sold in the seed-stores. When broken into small pieces, it may be planted two or three inches deep in a spent hot bed in the spring, or in a bed made by alternate layers of good sandy loam and the horse-droppings named above. There may be two or three layers of each, the strata of horse-droppings being made four or six inches thick, and of the loam two inches, forming altogether a thickness of sixteen or eighteen inches. The bed may be large or small, as is found convenient, and will succeed in a cellar not quite dark, or under a shed, or in the open air, if formed so as to shed rain. It should be pretty thickly covered with loose straw, which must be replaced after each cutting of mushrooms.

Instead of planting the bed with spawn, if in the season of mushrooms, each layer, as it is made, may be moderately watered with lukewarm water in which ripe mushrooms have

been soaked and stirred. When finished, the last layer being loam, it must be covered with stable manure sufficient, with that already in the bed, to bring on a gentle fermentation. In a few weeks the "spawn" ought to be found spreading generally in the mass, and whenever this occurs the covering of manure is to be taken off, and the straw substituted, as above directed. After this, if it becomes very dry, it may have occasional gentle waterings with lukewarm water.

In this process, however, success or failure will greatly depend on the skill with which the fermentation is tempered; so that, in general, planting the spawn may be deemed more reliable. A mushroom bed properly treated will continue to yield its products for three or four months if a temperature equal to moderate spring or fall warmth be maintained, say about 60°.

Mushrooms are very greatly esteemed by many on account of their rich, peculiar, and high flavor, whether stewed, or fried in sweet fat, or made into catsup in the ordinary mode, with suitable spices.

In gathering wild mushrooms there is sometimes danger of getting by mistake other kinds of fungi which may be poisonous. The true mushroom has a short stout stem, reddish gills, and an agreeable odor, considerably resembling the smell of the fruit of the egg-plant.

Another variety of eatable mushroom (*Agaricus Edulis*), known as the "steepie-top," is sometimes found, though much more rarely than the former.

In the lots it comes earlier than the common, with a longer stem and conical top, but having, like it, a pleasant smell. It has not, I think, been raised artificially.

MUSTARD.

French, *Moutarde*.—German, *Senf*.—Spanish, *Mostaza*.

WHITE (REALLY YELLOW). BROWN.

BRIEF DIRECTIONS.

Sow the white mustard thickly in shallow drills a foot apart from time to time through the season, each time one week

later than the corresponding sowing of pepper-grass (see page 166); treat in the same manner, and they will be ready to cut together.

White mustard is chiefly used, either alone or with pepper-grass, lettuce, etc., in salads, for which purpose it is cut before the third leaf is formed upon the plant, or pulled, and the mere roots cut off. When of larger growth it is sometimes used for greens. See page 144. The seed is used medicinally, and also for seasoning pickles. Brown mustard is raised for the seed, from which the condiment known upon our tables as mustard, when pure, is chiefly made.

NASTURTIIUM.

French, *Capucin*.—German, *Kapersinerblum*.—Spanish, *Nasturcio*.

TALL. DWARF.

BRIEF DIRECTIONS.

Sow in good soil, in drills an inch deep and three feet apart, and brush them like peas; or by a fence or trellis upon which they can climb; or they may be planted in hills four feet apart each way, either with or without brushing. Keep them clean until they begin to run, and afterward they will take care of themselves.

Time: the opening of spring. In New York, first of May.

The young plants of nasturtiums are highly esteemed in salads. The flower-buds and the green seeds, with their tendril-like stem, make pickles, which are often preferred to capers. See page 167. The flowers are quite ornamental, varying from light yellow to maroon.

OKRA.

French, *Gombo*.—German, (?).—Spanish, *Quimbombo*.

LONG, OR SOUTHERN. SHORT, OR NORTHERN.

BRIEF DIRECTIONS.

Sow in extra rich soil, in drills one inch deep and three or four feet apart, and thin to a foot distance in the row; or

plant in hills three feet apart each way, five or six seeds in a hill, and when well up, thin to the three best plants.

Hoe often, keeping them perfectly clear of weeds, slightly and gradually hilling up.

Time: during corn-planting time, or immediately after.

Okra is a southern plant of the mallow tribe. It is of strong, coarse growth, from two to four feet high, bearing abundance of beautiful flowers, which are succeeded by long ribbed or smooth seed-pods. When these attain their full size, but while still tender, they are gathered for use. Their value is in the large amount of pleasant and healthful mucilage which they yield in boiling. On this account they are much used in thickening soups, for which purpose they may be kept for winter use by being cut up in cross slices or "rings," and dried upon strings like apples.

They are also boiled and eaten with drawn butter, as asparagus; or the tender pods are used for pickles. See page 167.

The ripe seeds, roasted and used for coffee, are, perhaps, not at all inferior to it.

The whole plant is also said to make excellent material for paper, the only difficulty being in obtaining quantity, an ordinary cart-load of the okra being required for each ream of paper. It is certainly worth while to ascertain carefully the value of the seeds as "coffee," that, if available as a substitute, the cultivation of the plant may be extended.

ONION.

French, *Oignon*.—German, *Zwiebel*.—Spanish, *Cebolla*.

1. RED. 2. WHITE. 3. YELLOW.

BRIEF DIRECTIONS.

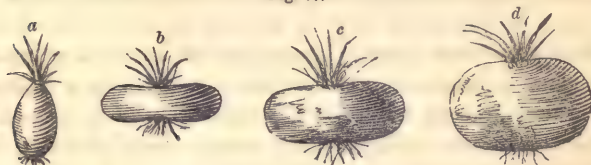
Sow in very rich, light soil, in drills twelve inches apart; cover lightly. Keep clean; and if large onions are wanted, thin to three or four inches; hoe often, and water with liquid guano, either from Peru or the hen-roost.

Time: sow at the very earliest opening of spring, whether at the South or North. They may also be sown in the fall

with safety, being perfectly hardy after they once sprout. In New York, sow during March and April.

FORMS OF ONIONS.

Fig. 77.



- a. Inferior Globe Onion, running to thick neck.
 b. Flat Rareripe, or early Onion.
 c. Common flat Onion.
 d. Best form of Onion.

The varieties of onion are numerous, and the names still more numerous than the varieties. The names designating color, are abundantly sufficient to distinguish the desirable kinds, form being entirely secondary, and readily changeable by the care or carelessness of the cultivator.

In general it may be remarked that a good form for a common turnip is a good form for an onion. See Fig. 80, p. 186.

Common red, number one, is an onion of the best quality, being milder and sweeter than the others, but the white and yellow are preferred where the discoloration produced in cooking by the former is regarded as a serious objection to its use. The yellow may generally be kept for use later in the spring than either the red or white.

The ground upon which onions are to be raised should be light and rich, having been used for some clean crop, or for onions, the previous season; and if, after the ground is prepared, straw or rubbish is spread evenly upon it and burned, it will destroy to some extent those weed-seeds which would be most troublesome, and afford a good top-dressing for the young crop. After the burning, the seed should be sown in drills one foot apart and half an inch deep, and carefully raked in. If the soil be *very* light, a gentle pressure upon the surface, either by the back of the rake or other means, will be found to set the earth about the seed and promote its prompt vegetation. After

the plants are up they should be kept perfectly clean by frequent hoeing and hand-weeding, and thinned to one or two inches apart, or to four inches if large onions are desired, and in their cultivation avoid any earthing up of the bulbs.

Onions while growing are greatly benefited by liquid manure (see p. 64), which may be applied once or twice a week until they begin to ripen. Onions which, from late sowing or other causes, do not swell and ripen, if earthed up a little and left out through the winter, will yield excellent young onions very early in the spring. Choice ones intended for seeding should also be set out in the fall, four or five inches deep.

ONION SETS.

Onions are often raised from what are called "sets," that is, very small onions of any color, which are either culled from the general crop, or obtained for this purpose by being sown late and very thickly, so that they are stunted in their growth, and form only small roots, which ripen prematurely. These are set out in the spring by being merely pressed with the thumb and finger into the soft, freshly-dug earth, at three or four inches apart, in rows a foot wide, and cultivated as above directed for onions from the seed. The young seed-stems which they usually throw up must be carefully broken out when six to twelve inches high, to aid or force the formation of bulbs. Sets thus treated yield a part of the green onions sold in spring, and the very early stringed and barreled-dry onions known in our markets as rareripes.

ESCALLIONS.

Onions that are too large for sets, and the refuse onions that remain over from the winter's consumption, when planted in the spring, in rich soil, yield mild and pleasant green onions, known as escallions, which are ready for use almost as early as shallots, but are greatly preferable to them.

TOP ONIONS.

RED. WHITE. YELLOW.

Top onions produce their sets, as the common kinds yield

their seed, in a ball on the top of the stalk. The common wild onion, so abundant in some dry lands, and so offensive in milk, and butter, and flour, is a small and strong variety of this species.

To obtain top onion sets, plant the large onions, the growth of the previous year, either in the fall or spring, at about six inches apart, in rows a foot wide, and keep clean until the ripening of the top sets, or seed, as it is more commonly termed, which will be shown by the changing color of the stalks. These sets, being carefully kept in a dry and cool, but not freezing place, until early spring, are set out and cultivated in the same manner as the common onion sets above described, p. 158, and yield their produce about the same time, or a little earlier.

For early use, the top onion, whether green or dry, is valuable on account of its general mildness; but it is also a little soft or spongy in texture, and therefore not esteemed after the coming in of the general crop of common onions.

Of late years, quantities of them, of large size, are annually brought early to Northern markets from Bermuda and the South.

POTATO ONIONS.

Potato onions are so called from their habit of producing their bulbs just below the surface of the ground. The large roots of these onions are planted, in the same manner as above directed for top onions, to furnish the sets, and these, in turn, produce onions for use. Unless raised with special care, they are apt to be strong and unpleasant. To have them good, it is necessary to divide the sets in the spring until each has but a single heart; then set them out in very rich, light soil, at the ordinary distance for onion sets, four inches apart in rows a foot wide, and cultivate them faithfully by frequent hoeings and top dressing, or the use of liquid manure (see p. 35), and they will yield you fine large onions, of a very mild and agreeable flavor.

WELSH ONION.

Ordinarily, vegetables reproduce themselves freely only in one direction, which may be either by sets from the root or by seed (see p. 66); but to this general rule the Welsh onion is an exception, multiplying itself rapidly by the offsets, which it produces almost as freely as shallots, and by the seed, which it yields in the same manner, though not quite so abundantly as the common onion. Sets for planting may therefore be raised from seed or obtained in the fall from the roots. These, if only intended for family use, should stand permanently in a single row, or as edging to a path, so that they may spread freely, the outer offsets being slipped from the roots for use in the spring; or, if intended for sale, they may be planted in August or September, in rich soil, three or four inches deep, in rows fifteen to eighteen inches wide, and a foot apart in the row, a new planting being made every fall, and the whole crop taken up for market every second or third year.

They do not swell into large bulbs, like common onions, but resemble a large shallot or an escallion (see p. 158), and are used in the same manner, and only while green.

PARSLEY.

French, *Persil*.—German, *Petersilie*.—Spanish, *Perejil*.

CURLED. PLAIN.

BRIEF DIRECTIONS.

Sow in shallow drills twelve inches apart, in very rich, light soil. Cover lightly, and if dry, give water. Thin the plants to three inches, and keep clean by repeated hoeings.

Time: throughout spring and summer at the North, or spring and fall at the South.

The earlier-sown crop of parsley at the North should be used during summer and fall, or be taken up and stored, with the roots in the earth, in a light cellar for winter. The later-sown crop, if not so late as to be feeble at the coming of winter, will bear the severe cold better, though sometimes either

will stand out safely, and at other times both will fail. A slight covering of litter or evergreen brush, however, will usually afford security.

Generally, the more curled and beautiful the plant, the less vigorous is its growth, and by some persons the plain kind is thought to be of better flavor; but in this respect either is good enough, and the superior beauty of the former variety will always insure it the preference where quantity is not a controlling consideration.

It is largely used for garnishing. The whole plant is also used in soups, and, in default of the plant, the seeds, tied in a small bag, may be substituted.

PARSNEP.

French, *Panais*.—German, *Pastinake*.—Spanish, *Chirivia*.

FORMS OF PARSNEPS.



a. Long, deep Parsnep, inferior.
b. Cup Parsnep, superior.

1. CUP, OR GUERNSEY. 2. LONG WHITE. 3. ROUND.

BRIEF DIRECTIONS.

Sow in good deep soil, in drills eighteen inches apart, and about an inch deep. Cover carefully and firmly, and if dry, give water. Thin the plants to six or eight inches, and hoe often and deeply till the tops touch.

Time: late spring or the beginning of summer at the North. At the close of summer in the South. New York, throughout May or in the beginning of June.

The cup parsnep, No. 1, so called from the shape of its crown, is on all accounts the best. Its form is good as well as its quality, and its medium length secures as easy harvesting as seems practicable for a deep-root crop.

The long white, No. 2, is apt to be comparatively thin and stringy, and sometimes runs so deep that it becomes a task to harvest it. The "round" (or rather "short"), No. 3, is a new variety, possessing nothing to induce its preference to No. 1. It is sometimes called *early*, but earliness in a winter root is not of special importance.

Parsneps may be sown at any time from April to July at the North, and as late as August or September at the South; the later the better if they can be driven rapidly in their growth by careful, constant cultivation. See remarks under Beet, p. 120.

If the crop is to be plowed, let the rows be two feet apart, and while the plants are quite small, thin them to six or eight inches in the row, and keep the earth about them clean and loose through the season.

The roots may be harvested in the fall, and stored in an out-house or cellar, either in a bin or in a pile, which should be slightly covered with sand or common earth; or they may be left in the open ground through the winter, and taken out for use as they are wanted. It should be remembered, however, that after they begin to grow in the spring they are undesirable for use, becoming in a measure poisonous.

The parsnep has some advantages over other root crops; it

is not affected injuriously by frost after being stored, and is less watery. See *Analysis and Value*, page 500.

PEAS.

French, *Pois*.—German, *Erbse*.—Spanish, *Guisantes*.

EARLY: Cedo Nulli. Canada. Emperor. Washington. Frame. Petersburg. Warwick, &c., &c.

LATE: Knight's Dwarf. Dwarf Blue Imperial. Royal Dwarf. Dwarf White Marrowfat. Tall Marrowfat, &c., &c.

BRIEF DIRECTIONS.

Sow in drills from two to five feet apart, and about two inches deep. When well up, hoe and draw the earth to them lightly, and set brush from three to six feet high along them.

Time: from November to February at the South. At the North, from March to the last of May.

All the first named are only sub-varieties of the same species, and while some of them are to be preferred on account of their superior earliness, it will be found a general rule that the earlier the pea the poorer the crop.

Of the early kinds named above, the Canada and the cedo nulli are valuable for extra early; for ordinary crop, the early Washington, frame, Emperor, Petersburg, or Warwick, the last-named, if genuine, being perhaps the finest flavored of early peas when cooked and eaten freshly gathered. Delicacy of flavor is generally a fugitive quality, and peas long gathered or heated lose it.

The finer varieties of peas are in general less abundant bearers than those which are inferior. The combination of fair quantity with good quality will be found in the early varieties already commended; and among the later kinds, in the dwarf blue imperial, the royal dwarf, sometimes called Missouri marrowfat, and the large white dwarf marrowfat.

Of peas it may be remarked that, commonly, those which are perfectly full and smooth are less sweet than those which are wrinkled or misshapen, the degree of sweetness being usually in proportion to the shrinkage of the seed in drying. Knight's

marrowfat, and kindred varieties, which are the sweetest of peas, are often found shrunk almost to a cube form. The analogy between this and the similar shrinkage of sugar corn will at once suggest itself to the intelligent reader, and may afford matter for interesting investigation. It should, however, be remembered that mere sweetness is not all that is desirable in a good pea. To some persons excessive sweetness would be an objection.

Numerous fancy kinds of peas are annually imported from Europe by our seedsmen, some of them of great excellence, but requiring too much care and too high culture to become staple varieties. Of such, the "Champion of England" among kinds called early, and the "British Queen" among later ones, may be named as of the highest character.

In speaking of peas, the terms dwarf and tall are relative, and very indefinite. The Spanish dwarf pea grows six inches high, the dwarf marrowfat nearly six feet, yet the latter is rightly enough named dwarf, for the *tall* marrowfats grow from ten to twelve feet, needing bean-poles to support them instead of pea-brush.

The ground for peas should never be freshly manured, on account of the overgrowth of vine which it occasions, but for late peas the soil should be rich and strong; for early ones, simply *good* and dry.

Peas may be sown at intervals of one or two weeks from the very first opening of spring till a month after, or until the close of corn-planting time. The drills for them should be full two inches deep, for the early kinds two feet apart, and for the late kinds from three to five feet, according to the height they are calculated to grow. The brush for peas of the proper height for the kinds sown should be stuck firmly four or five inches apart on each side of the row, with just so much inclination inward as to bring the tops together, yet leaving the whole as bushy or spreading as possible, that the growth may have room to wander, and as large a surface as possible be exposed. No crowded crop ever grows finely or yields superior products.

Some sow their peas in double rows at six or eight inches

apart in order to save a portion of the labor of brushing, but it is very doubtful if a double row will, in general, yield more than a single one, for the blossoms are mostly thrown out in proportion to the exposure of the vines to the air and the room which the roots find. Every one has observed that two plants growing close together do not make a larger growth or yield a heavier product than if but one had occupied the place and drawn its nourishment from the same surface.

The hoe should be used promptly and carefully when the peas are up one or two inches, and in the course of the season frequent hoeing will be necessary to aid their growth and to earth them up.

In large market-garden pea culture, brushing is entirely dispensed with; they are sown in wide rows, and the crop is heavily earthed up by plowing.

A crop of turnips may generally be obtained from the ground upon which early peas have been raised, or it may be prepared for the fall sowing of spinach, lettuce, etc.

Peas may be profitably raised as a farm crop in Northern or high localities, where the pea bug will not infest them. They are usually sown broadcast, at the rate of about four bushels to the acre, with a few oats intermixed to give the pea-vines a partial support, and are mowed or cradled when ripe. But, wherever a good crop of corn can be raised, peas should disappear from the list of ordinary farm crops. For *Analysis and Value*, see page 500.

PEPPER.

French, *Piment*.—German, *Spanischer Pfeffer*. *Pfeffer*.—Spanish, *Pimento*.

1. SQUASH. 2. BELL. 3. SWEET SPANISH. 4. CAYENNE.
5. BIRD.

BRIEF DIRECTIONS.

Set the plants twelve or fifteen inches apart, in rows eighteen inches wide, in very rich, warm soil, and hoe often till they are in full blossom.

Time: in hot bed, sow six weeks before corn-planting time.

In the open ground, sow or set out plants just before first corn-hoeing.

In household use, peppers are in demand chiefly for making or flavoring pickles. The squash pepper answers both these purposes, for the former of which its thick, fleshy character especially fits it.

The bell and sweet Spanish peppers grow larger, but are comparatively thin, though they are often used and esteemed for the same purposes as the former, particularly in making man-goes.

The long, or "Cayenne," is chiefly used in the manufacture of the condiment known by that name; and the bird pepper is used to make the familiar "pepper-sauce."

Peppers, whether sown in the open ground or transplanted from the hot bed, should stand in rows eighteen inches wide, leaving the plants at least twelve inches apart. They should be often hoed, and the earth gradually but moderately raised around them, so as to afford support to them when top-heavy with their fruit.

PEPPERGRASS.

French, *Cresson Alenois*.—German, *Kresse*.—Spanish, *Mastuerzo*.

1. CURLED. 2. PLAIN.

BRIEF DIRECTIONS.

Sow in shallow drills, twelve inches apart. Cover lightly, and if dry, give water. Keep perfectly clear of weeds.

Time: every two weeks throughout the season, if it is desired.

Between the above varieties there is but slight difference, though the first named is esteemed of better quality and prettier appearance than the last. It may be successfully raised as above directed, and the ground upon which it is sown in spring can be used for some later crop.

There is a broad-leaved cress, sometimes known as roquette, somewhat resembling the water cress, by some called land cress, and by others garden cress, which is a hardy biennial that yields a strong peppery salad through the fall and very early in the following spring, if sown and cultivated as parsley

(which see, p. 160). If sown at all, it should be in a warm, rich spot, and if slightly covered for winter it will start the earlier in spring.

PICKLES.

French, *Saumure*.—German, *Pekel*.—Spanish, *Eschabeches*.

A great variety of articles are used for pickles, viz., beans, beets, brocoli, cabbage, especially the red or purple, carrots, cauliflower, cucumbers small and large, green and ripe, the seeds being first removed from the latter, garlic, okra, *Martynia* or proboscis plant, melons, nasturtiums, small onions, peppers, shallots, tomatoes, Madeira-nuts, black walnuts, butternuts, &c. The processes of their preparation are also somewhat varied.

Nasturtiums are simply bottled in cold vinegar, furnishing their own spice.

Cabbage is shredded as cole-slaw, and scalded with the hot vinegar and spices which have been boiled together, and to which the necessary salt has been added.

Beets and carrots are first cooked as for ordinary use, then the hot spiced vinegar is poured over them, and when cooled they are fit for use.

Onions, garlic, and shallots are improved by being first lightly boiled in milk and water. They are then skinned, and the hot spiced vinegar poured over them as the former.

Beans, cucumbers, okra, *Martynia*, melons, peppers, and tomatoes, all which should be selected while tender, and as nearly as possible of uniform size, also brocoli and cauliflower, when carefully divided into rather small pieces, may all be salted with dry salt, or strong brine, if they will not make it, for eight or ten days; then being washed off and soaked in fresh water for twenty-four hours, they should be put in cold vinegar, with the necessary spices, and set in a stone pot upon a stove until they are cooked through, or in a kettle over a slow fire until upon the point of boiling, being careful to keep them under the vinegar, and if uneven in size, the larger ones at the bottom. Then take them off, and put them while hot into proper vessels; cover tightly, and when cooled they may be used.

Madeira-nuts, black walnuts, and butternuts, if taken while

yet so tender that a needle will readily penetrate the inner shell, and, as a preparatory step, soaked for a week in water or brine to leach off their excessive bitterness, may be salted and made up by the process last described, and are, by some persons, preferred to all other pickles.

The spicing is varied according to individual taste. Besides the ordinary spices, white mustard-seed, peppers, nasturtiums, horseradish, onions, garlic, etc., are often mixed with the various kinds of pickles to flavor them.

PIE PLANT.

French, *Rhubarbe*.—German, *Rhubarber*.—Spanish, *Ruibarbo*.

EARLY. LARGE LATE. GIANT SEEDLESS.

For the seeding varieties sow from February to May, in good soil, in a drill about an inch deep; cover carefully, and if dry, give water two or three times. Keep the plants clear of weeds through the summer, and in the following fall or spring set them out where they are to remain permanently, in deep and very rich soil, in rows three to four feet wide, and fifteen to thirty inches apart in the row.

Let it be well cultivated through the second year of its growth, and well manured in the fall, and in the following spring it may be freely plucked for use.

The earlier varieties of pie plant produce leaf-stems twelve or fifteen inches in length, and from one to two inches in circumference, and may be set out at the smaller distances named above; but the large varieties, as the *Victoria*, the *giant seedless*, etc., coming later in the season, and, with high culture, yielding leaf-stems from two to three feet long and proportionably thick, require the full spaces mentioned.

Experienced cultivators usually cut out the seed-stalk when it first starts, in order to encourage the leaf growth. The *giant seedless*, as its name imports, never produces a seed-stalk unless from a diseased plant, and with proper care may be made to yield its leaf-stems more largely than any other variety.

For a private garden about a dozen plants of the early and as many of the late varieties will usually furnish a supply.

Pie plant may be easily forced by the following simple process: Over each of the plants you wish to force place an old barrel, open at both ends, but with a loose head to cover the upper end as occasion may require. Pile fresh stable manure around it, from a foot thick at the bottom to six inches at the top. Put the cover on only in freezing weather; and if your root be large and vigorous, as it should always be for forcing, the growth of long, fine, tender leaf-stem will soon fill the barrel. The barrel must be removed as soon as you judge that a fair amount of leaf has been taken from the plant, and the operation, which is really a pretty severe taxing process, should not be repeated upon the same plant two years in succession. What are called young plants, in their second and third years, generally produce the finest specimens of growth. To have a constant succession of these, it is only necessary to uncover the crown of an old plant early in the spring, and with a knife separate a portion of the young outer shoots that are just starting, taking with them a small piece of the parent root. Set them out and cultivate them as above directed, and in the next two years they will probably produce their largest and best leaf-stems.

In gathering pie plant the leaf should not be *cut* from the plant, but deftly slipped off by a twisting, sideway pull.

It is used in making puddings, pies, and tarts, and for stewing. Its acid is pretty strong, yet not rough; and it is remarkable that in stewing, especially when the sweetening is a mixture of sugar and molasses, quite a variety of fruit-flavors, as peach, plum, etc., are incidentally brought out, though, so far as I know, no *rule* for their production can be given. It may also be remarked that if, after the stem is peeled and cut up into half-inch pieces, boiling water be poured upon it and allowed to stand for half an hour, and then poured off, and the small quantity of water necessary to stew it with be added to it fresh, almost half the ordinary amount of sweetening will be saved, without any great injury to its flavor. Some persons, however, avoid either peeling or scalding it, as calculated to destroy its peculiar *goût*, especially while young and tender.

POTATO.

French, *Pomme de terre*.—German, *Kartoffel*.—Spanish, *Papa*.

KIDNEY. WESTERN RED. BLUE-NOSE. CARTER. MERCER, &c.

BRIEF DIRECTIONS.

Plant in rows from two feet to thirty inches apart, in rich, warm soil, and cover three or four inches deep. Dress them with plaster as soon as they are well up, and hoe often, hilling them carefully, but not high, in the process.

Time: for early crop, plant at the very first opening of spring North or South. For the main crop, a few weeks later, which at New York may be in the beginning of May.

The culture of the potato is so well known that it need scarcely be mentioned as a garden vegetable, except with a particular object, viz., the raising of very early potatoes. For this purpose the sets should have some special preparation. If selected in advance, and placed in a warm room or cellar, so that they start to grow about half an inch or a little more before planting, and then be put in with care, and promptly covered from the sun, they will, if the season prove favorable, go right on to their maturity, and some time will be gained.

For this crop select a very warm spot, and manure it thoroughly with fresh warm stable manure dug or plowed in. Plant the sets at about one foot apart, in rows two and a half feet wide, either in an opened shallow furrow or in holes made for the purpose with the hoe; in either case, dressing with a half handful of plaster, or lime, or bone-dust, to each set, and covering them about three inches deep.

Or the manure may be laid thickly in the planting furrows, made deeper for this purpose, and the sets be laid immediately upon it, and dressed and covered as before directed.

If the weather prove cold after planting, a light covering of litter or coarse manure spread upon the surface will be a benefit.

Let the hoeing be performed promptly and deeply when they appear above ground, and repeated again and again, dressing

them at least once with half a handful of plaster (gypsum) to each if not used at the time of planting, and hill them gradually, and they will soon furnish your table.

The Mercer or "Nutmeg" may be planted for the early crop.

The potato has of late years become subject to a disease known as the "potato-rot," by which the whole crop of a farm or a district perishes within a few days. As yet it remains entirely unaccounted for, neither has any remedy for it been discovered.

The ground intended for Lima or other pole beans may be half cropped with early potatoes by planting the latter in rows four feet wide, and afterward planting the beans in their hills between them. The potatoes, if well planted and tended, will come off in time to give the beans the whole space, and the rough manure used for the former will be reduced to a proper state to feed and stimulate the latter.

Frequent and pretty thorough experiments have been made to ascertain the proper size for seed potatoes, and whether they ought to be planted whole or may advantageously be cut up, but no satisfactory conclusion has been arrived at. Results have been obtained from plantings of the mere eyes scooped out of the size of a cherry, and even from thick peelings, nearly or quite equal to those given by plantings of large whole tubers. In this dilemma, the prevailing sense of intelligent cultivators seems to have fallen back upon the general principle that "like produces like," and to have concluded that the sets ought to be at least mature, and of fair (egg) size, and that, if much larger, they may be cut. The principle and the practice under it are sound, especially in all vegetable life, where mere habit fixes with marvelous rapidity. The results which embarrassed the decision were doubtless due to the special care given in the course of the experiments, and would fail in any general system of culture. The rule may be safely adopted to plant only mature tubers. If of egg size, or but a little larger, plant them whole; or if seed be of great importance, divide them lengthwise or diagonally. Only one or two eyes grow to top, however many the set may have. If, therefore, you have only large potatoes, cut them into pieces con-

taining two or three eyes each ; let them dry a little before planting ; set them out as directed ; give them good culture, and your crop will be as good as soil and season justify you in expecting. Nipping off all the blossoms before they open, if you can find time for the operation, will somewhat increase the product. See *Analysis and Value*, page 500.

For Sweet Potato, see page 182.

PUMPKIN.

French, *Citrouille*. *Potiron*.—German, *Kürbis*.—Spanish, *Calabaza Amarilla*.

1. SEVEN-YEAR. 2. CHEESE. 3. COMMON FIELD. 4. MAMMOTH.

BRIEF DIRECTIONS.

Plant in very rich warm soil, in hills six feet apart, six or eight seeds in a hill. When well up, thin to the three best plants. Hoe often till the blossoms open.

Time : throughout the time of main corn-planting. In all May at New York.

The keeping, or “seven-year” pumpkin, is an excellent vegetable, drier and richer in quality, and keeping better than any other, though not actually lasting seven years. The cheese, or West India pumpkin, is also of great excellence, being far handsomer and perhaps more delicate than the former. The common, or field pumpkin, is too well known to require description, and is sometimes preferred by those who love its genuine pumpkin flavor.

The mammoth pumpkin, in all its varieties, is rather matter of curiosity than profit. It is seldom of fine quality, is too large for profitable domestic use, and does not generally yield more weight of produce from a given quantity of land than the moderate-sized varieties.

The brief directions given above are ample for the successful cultivation of this vegetable, which is also often planted among corn. Pumpkins (and also squashes) may be kept well into winter in any dry, cool place, out of the reach of frost, either

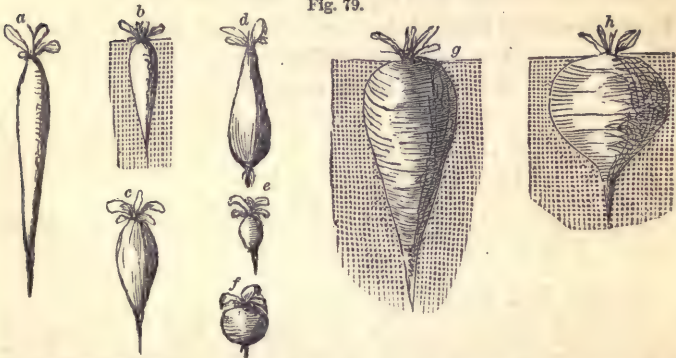
by hanging them up singly, or by packing them away in bins or barrels with chaff or cut straw; or they may be kept for use in spring, when milk and eggs abound, by being stewed and then dried upon a board in the sun or an oven; or, still better, by being stewed and put up in patent fruit-cans in the ordinary manner.

RADISH.

French, *Radis*. Rave.—German, *Rettig*.—Spanish, *Rabano*.

FORMS OF RADISHES.

Fig. 79.



a. Good long Radish.

b. Half long "

c. Pear-shaped "

d. Uncouth or club-form; Chinese
rose-colored winter Radish.

} Mongrels.

e. Inferior Turnip Radish.

f. Good " "

g. Inferior black fall "

h. Superior " "

Long Scarlet. Long White Naples. Scarlet Turnip. White Turnip. Black Fall, or Spanish. White Fall. Chinese Rose Winter.

BRIEF DIRECTIONS.

Sow in shallow drills or on light, rich soil, left a little rough, and rake the seed thoroughly in. When well up, sow ashes or poudrette pretty liberally upon them.

Time: from the earliest spring to late autumn, omitting the hottest months of summer, at the South or North.

Of the various kinds of radish, the long scarlet and scarlet

turnip are most highly esteemed. The white varieties are sometimes supposed to be milder, and to bear the heat better than others, and on this account to be preferable for summer use, but we are not sure that experience sustains these notions.

Radishes of a purple color are almost always very strong, even acrid, but all kinds are liable to become so by neglect or error in their cultivation.

The various forms intermediate between the long and turnip radish are generally the result of accidental admixture, and any one who chooses may reproduce them from original sources. They are merely fanciful, having no peculiar merit, except that the pear-shaped or half long varieties might perhaps succeed on soils where the longer kinds would fail.

The black or white fall or Spanish radish should be sown and gathered at the same time as common turnips, and may be stored in sand for winter use. It is a large, coarse-looking radish, but of fine, solid texture and good quality.

The Chinese rose-colored winter radish is of pretty appearance and good quality, and may be sown at the same time or a little later than the black Spanish.

Radishes should be sown in light, rich soil, in drills about eight inches apart and half an inch deep, and covered carefully by raking along the drills, and adding, if it seem necessary to settle the earth about the seed, a gentle pressure with the back of the rake, or by means of a board, which may be laid over it and pressed with the foot; but in experienced hands a slight beating with the back of the rake will be the quickest mode. Or the seed may be sown broadcast, being thinly scattered over the ground and thoroughly raked in. If the weather be dry when you sow, water lightly each evening until the seed sprouts, and continue it afterward if it seem needful.

Sow ash compost or poudrette upon them at least twice during their growth, or water occasionally with liquid manure, and, if sown in drills, hoe carefully between them. Radishes may be sown at intervals of one or two weeks, from the earliest opening of spring until late fall, and at the far South through

“the winter months;” but, unless the season be peculiar, or great care be used, the summer crops will not be good.

From the brief but sufficient directions thus given, it would seem easy to raise good radishes, yet, if we except a part of those brought to city markets, such are exceedingly rare. Any cause that checks the growth of a radish destroys its quality. This cause may be the poverty of the soil, its natural unsuitableness, as being heavy or cold, or having some special defect; or it may be the occurrence of cold weather after the crop has well started to grow, or the prevalence of summer heat. Either of these causes may suffice to account for strong, unpleasant roots. Radishes thus checked in their growth are almost invariably infested with worms, which are a consequence, and not, as sometimes supposed, the cause of their check.

If the seed sown be of inferior stock, the radishes will be strong and stringy, and the eating of them will be like chewing small, tough sticks. But to have good radishes, if seed of good stock be sown, it is only necessary that they grow *steadily* and *rapidly*, be pulled as soon as they attain a fair size, and eaten while fresh from the garden.

From what has been said, it is plain that a light and rather sandy soil is to be chosen for radishes. Where this can be made artificially (see Mechanical Preparation of Soil, p. 18), radishes of any kind may be sown; but where experience has proved that the long radish will not succeed, the turnip radish only should be sown, avoiding any attempt to raise very early crops, and giving the ground careful preparation and thorough manuring.

Radishes are often combined with other crops calculated to succeed them, as lettuces, or beets, or early cabbages; but, unless land is very valuable, or manure scarce, it is not worth while to adopt this mode. (See Combination of Crops, p. 85.)

RAPE OR COLEWORT.

French, *Colza*.—German, *Repskohl*.—Spanish, *Nabo Silvestre*.

Both the plant and seed of rape resemble the brown mustard. It is sometimes called cole, or colewort, from its French name, *colza*. It is often sown thickly in drills a foot apart,

and cut for greens when six or eight inches high. See Greens, page 143. Cabbages of various kinds being sometimes sown in the same manner and for the same purpose, all young non-heading early cabbages have come to be called "coleworts," corrupted to "collards."

In certain sections the colewort is sown largely for its seeds, on account of the oil they yield, and for feeding to birds.

ROQUETTE.

See Pepper-grass, page 166.

SAGE.

French, *Sauge*.—German, *Salbey*.—Spanish, *Salvia*.

BRIEF DIRECTIONS.

Sow in a shallow drill, in rich soil. Cover lightly, and if dry, give water. When the plants are from two to four inches high, transplant and set them in a bed or in rows a foot apart each way, and keep clean.

Time: in all spring.

Sage is used largely in sausages, and for various purposes in cookery. It is also used in medicine, and formerly its virtues were so highly esteemed that it passed into a proverb, "Why should a man die who has sage in his garden?" The moderns do not think so highly of it, but it is still used in the form of sage-tea as a drink, and with alum as a gargle.

Sow the seed and transplant as above directed. Cut and dry the leaf for use when at full size, which will generally be after mid-autumn, taking care not to trim the plant too closely.

SALSAFY (or Vegetable Oyster).

French, *Salsafis*.—German, *Bocksbart*.—Spanish, *Ostra ò Ostion vegetal*.

BRIEF DIRECTIONS.

Sow the seed in rich, well-prepared soil, in drills fifteen to eighteen inches apart, and an inch deep; cover it carefully, and press the earth lightly upon it, and when well up, thin the plants to four or five inches apart, and hoe and weed often, until the tops meet across the rows.

Time: late spring or beginning of summer at the North; at the South in early fall; and in the far South it may also be sown with the very earliest spring crops for summer use.

At New York in all May or beginning of June.

The salsafy has rather a narrow, flag-like leaf, and its root resembles a small white parsnep.

In localities where veritable oysters are not readily obtained, it affords an agreeable substitute. For this purpose, the root should be washed and grated, seasoned to taste, mixed with a batter made of milk and flour, and made light either with soda and cream of tartar or eggs, and fried with sweet fat in small cakes. It is also occasionally used in soups, or boiled and mashed as squash.

SCORZONERA.

French, *Scorzonere*.—German, *Scorzionerwurzel*.—Spanish, *Eschorzonera*.

Sown and treated precisely as salsafy, used for the same general purposes, and scarcely at all differing from it except in being too bitter to use without previous soaking.

SEA KALE.

French, *Chou Marin*.—German, *Meerkohl*.—Spanish, *Breton de Mar*. Col *Marina*.

Sow in early spring, in rich soil, in a drill an inch deep, and cover carefully and rather firmly.

Keep the young plants clean throughout the season, and in the following spring plant them out where they are to stand, in deep and very rich soil, in rows four or five feet wide, setting the plants eighteen inches apart in the row.

Hoe often and deeply through the season, and after the tops die in the fall, ridge up the earth from the intervals over the crowns of the plants to a depth of fifteen or eighteen inches. In the spring they will push up through this ridge a tender, white, fleshy growth, which may be cut near the crown of the plant by opening the side of the ridge, or removing it entirely from the plants you gather. These branched stems are cooked and eaten as asparagus.

When the spring cutting is completed, having leveled down the ridges, manure the intervals, and cultivate as before, to give it vigor for the next year's taxing.

It is sometimes planted in rows or hills only eighteen inches or two feet apart each way, and, instead of being ridged, the crowns are slightly covered for winter, and in the spring earthen pots, known as "sea-kale pots," about fifteen inches deep and twelve inches diameter, are placed over it to force and blanch it, which sometimes, also, are surrounded with stable manure to hasten the process. These pots have a hole in what would ordinarily be called the bottom, but which, as inverted, is the top, large enough to admit the hand for cutting the crop, to which a knobbed cover, like the cover of a water-jar, is fitted by the potter.

Like asparagus, sea kale is a maritime plant, and is, by some persons, very highly esteemed as a delicacy; but a large majority would justly conclude that "it costs more than it comes to."

SHALLOTS.

French, *Echalote*.—German, *Schalotte*.—Spanish, *Chalote*.

Plant the sets, from early fall to winter, in very rich soil about three inches deep, in rows fifteen inches wide, and about six inches apart in the row. Hoe often and deeply, and keep perfectly clean. As early in the spring as practicable, hoe deeply, and top-dress once with poudrette, or guano, or liquid manure, and pull them as soon as sufficiently grown for use.

The shallot is a well-known kind of onion, which increases largely by offsets from the root, used chiefly at the very opening of spring, being the earliest of the onion kind that appears in the green state in market.

SOREL.

French, *Oseille*.—German, *Sauerampfer*.—Spanish, *Acedera*.

The French or garden sorrel is a perennial plant, with leaves as large as those of the yellow dock, and of a strong, clear, acid taste. It is raised from seed sown in the spring in a shallow drill, and a few plants may be set out where they can stand permanently and be out of the way.

It will be esteemed by those who fancy salads made up in the modes of Paris, or Madrid, or Vienna; but, after all, it is simply the "sour-grass" of our boyhood.

SPINACH.

French, *Epinard*.—German, *Spinal*. *Spinal Kohl*.—Spanish, *Espinaca*.

PRICKLY (SEEDED). ROUND (SEEDED) OR SAVOY.

BRIEF DIRECTIONS.

Sow in shallow drills twelve inches apart. Cover lightly, and if dry, give water. Keep clean, and spread straw or ever-green brush thinly over it for the winter.

Time: earliest fall or first of spring at the North. Throughout the fall or at the opening of spring at the South generally. At the extreme South, throughout the "winter months" also. In New York, September and March.

Spinach is the first green vegetable that spring yields for cooking, affording a pleasant and wholesome dish at a season when nothing remains of our last year's store but roots and winter cabbage. Many persons esteem it very highly for greens, while some think it but little superior to the common dock leaf. It comes, however, earlier than the latter, and has therefore an advantage in point of time, if not in quality.

There are several varieties, but the round seeded Savoy spinach, having a thick, crumpled leaf, is the best for ordinary use. It should be sown in rows as above directed, and if sown in the fall, hardy cabbage lettuce may be profitably sown in alternate rows between it, which will winter with the same slight covering, and may either be transplanted at the opening of spring for very early heading, or cultivated where it stands after the spinach is cut.

NEW ZEALAND SPINACH.

The New Zealand spinach, *Tetragona expansa*, is a rather coarse summer "green," not particularly desirable where the ordinary green vegetables are attainable, but may be of value in very warm climates.

It may be planted in all spring, in hills three feet apart, in very rich soil, five or six seeds in a hill, and must be kept clean by frequent hoeings, drawing up the earth from time to time so as to form a pretty large flattish hill, over which the plants will throw their strong luxuriant growth, from which the leaves for cooking may be gathered throughout the summer.

SQUASHES.

SQUASH (SUMMER).

French, *Giraumon*. Courge.—German, *Melonen Kurbis*.—Spanish, *Especie de la Calabaza*.

BERGEN BUSH. WHITE SCOLLOP. EARLY GOLDEN. SUMMER CROOKNECK.

For Squash Bug, &c., see Fig. 65, page 102.

BRIEF DIRECTIONS.

Plant in very rich warm soil, in hills four to six feet apart, six or eight seeds in a hill, an inch deep. When well up, thin to the three best plants. Hoe often, and gradually hill up till the blossoms open.

Time: throughout the time of corn-planting South or North. At New York in all May or early in June.

The Bergen squash is the best of all bush squashes, and may be advantageously substituted for all summer squashes, whether bush or running, and perhaps also for all winter squashes, except the cocoanut, or Porter's winter.

It is a heart-shaped green and white squash, of medium size, and in rich soil a good cropper, coming as early as any, and continuing as long in bearing.

Even while the shell is soft, it is superior to the white or golden scollop, but it is not in perfection until the shell begins to harden considerably, when it becomes dry and rich beyond any other summer variety.

The white and golden scollop, the summer crooknecks, and the various fancy varieties, have their merits, but none of them combine so many desirable qualities as the Bergen, which, as

before stated, if planted rather late, may be kept for winter, care being taken to use the soft-shelled ones first.

SQUASH (WINTER).

COCOANUT, OR PORTER'S WINTER. WINTER BELL. CANADA CROOKNECK, &c.

BRIEF DIRECTIONS.

Plant and tend in the manner above directed for summer squash, but at greater distances, say from six to ten feet apart.

Time: in the time of main corn-planting South or North.

At New York in all May.

The winter bell and Canada crookneck squashes are very good varieties, the latter especially yielding abundantly.

The cocoa-nut, or Porter's winter squash, is the best of all known squashes. Its vines, however, run amazingly, and, unless very highly cultivated, it is rather less productive in northern latitudes than other varieties. It is sometimes called the Valparaiso squash, and oftener Porter's, because originally introduced from that place by the late Commodore Porter. Its other and prevailing name is derived from the form of the fruit, which somewhat resembles a cocoanut with the husk on. -It has a roughish coat of a gray or stone color.

The flesh, which is not very thick, is of a deep annatto orange color, and extremely rich and dry.

Squashes that are to be kept for winter use should be treated as directed for pumpkins, page 172.

SUMMER SAVORY.

French, *Sariette d'été*.—German, *Saturei*. *Bohne Kreitchen*.—Spanish, *Ajedrea*.

BRIEF DIRECTIONS.

Sow in very shallow drills or upon the fresh surface, in rows twelve inches apart, in rich light soil. Cover lightly, and if dry, give water. Thin the plants to three inches distance, and keep clean.

Time: throughout spring at the North. At the South, ei-

ther at the opening of spring or early in the fall. At New York from March to July.

It should be cut for drying soon after it begins to blossom.

SWEET BASIL.

French, *Basilic*.—German, *Basilikum*.—Spanish, *Albahaca*.

SWEET MARJORAM.

French, *Marjolaine*.—German, *Marjoran*.—Spanish, *Mejorana*.

These are two aromatic herbs, used in cookery for seasoning, and may be sown and treated in all respects as summer savory. See above.

SWEET POTATO.

French, *Patate Sucré*. *Patate Douce*. *Patate Malaga*.—German, *Bataten*. *Suesze Kartoffel*.—Spanish, *Battatas*.

Sweet potatoes are raised from sets. These are either small potatoes, raised for this purpose from summer cuttings of the vines in the previous year, or the cullings of the general crop carefully wintered in dry sand, etc., or the young shoots of large or small wintered tubers, started at the opening of spring in a hot bed or box to furnish sets for the season.

When four or five inches long the shoots are ready for planting, and should be carefully taken off and set out as they successively attain this size.

Rich, warm, and, if possible, sandy soil must be chosen, and about the time of corn-planting the hills should be carefully prepared, at four feet apart each way, raising them slightly, and mixing in plenty of rich compost, unless the whole has been well manured. About the time of the first corn-hoeing plant three or four sets in each hill, covering them three inches deep if small or cut tubers are planted, and if the young shoots are used let their points just appear above ground, and press the earth gently about their lower ends; or set them eighteen inches apart, in rows three feet wide.

Protect them a while from either cold or sun if it appears necessary, and keep them perfectly clean and frequently hoed, dressing them once or twice with plaster or ash compost, grad-

ually enlarging the hill or ridge until the growth of their vines prevents farther work among them.

When perfectly ripened and carefully dried after digging, they may be stored in dry sand with safety for winter use.

In the field culture of sweet potatoes the land is prepared and the hills or ridges made and cultivated with the plow.

THYME.

French, *Thym*.—German, *Thimian*.—Spanish, *Tornillo*.

Sow in rows a foot wide upon the surface of finely-prepared, rich soil, and water moderately until the plants come up. When two or three inches high, thin or transplant to six inches apart, and keep perfectly clean.

Time : spring at the North ; spring or fall at the South.

This is a pleasant and valuable herb, used for seasoning stews, poultry, etc. It should be cut for drying as soon as it begins to blossom, or before frost if sown too late to blossom.

TOMATO.

French, *Tomate*.—German, *Liebes Apfel*.—Spanish, *Tomato*.

LARGE CRUMPLED. APPLE. PEAR. CHERRY. GRAPE.

Either Red or Yellow.

BRIEF DIRECTIONS.

Set the plants eighteen inches apart, in rows two feet wide, or in hills three feet apart, in light, warm soil, not very rich, and plow or hoe deeply from time to time till the tops interfere.

Time : sow in hot bed from six to eight weeks before main corn-planting, when the plants may be set out or the seed sown in the open ground either South or North.

At New York, March in hot bed ; May in open ground, to sow or set out.

All the above varieties are named from their general size and appearance, and of each there is a red and a yellow variety. The red are generally preferred for cooking, and the yellow for preserves. All the varieties bear abundantly, though perhaps the large crumpled kind is the most prolific. For all ordinary

purposes, the apple or large smooth merits a decided preference. The cherry and grape varieties are pretty, but not otherwise valuable.

It is quite desirable to sow tomatoes early in hot bed, or in a box of good earth in the house if a hot bed is not made; but if not thus provided, they may be sown somewhat later, without artificial heat, in a warm, rich spot, the seed being lightly covered, regularly watered with water that is slightly warmed in the sun or in the house, and at night covered with a cloth, or mat, or box, until the weather becomes definitely warm. As soon as the plants are then ready, let them be carefully set out in rows two feet wide, and eighteen inches apart in the row, in light, warm soil, not made too rich, and either furnished with brush to climb upon or left to spread upon the ground, hoeing them often and deeply, gradually hilling them up until the tops spread so as to prevent it.

If very early tomatoes are desired, the plants should be potted as directed page 87; in about a fortnight change them into larger, say quart pots, and by the time it is safe to set them out they will be ready to come into blossom. If skillfully transferred from the pot to the hill, and, in case of unexpected cold, covered with pots or boxes, they will be scarcely at all checked in their growth by the change, and will quickly mature their fruit. In this, however, they may be aided by nipping the ends of the main shoots, limiting the growth of side shoots, and exposing the fruit to the sun.

Where tomatoes are raised in large quantities the ground may be prepared and furrowed as for corn, at three feet apart each way, two or three plants being set in each hill. All their necessary culture may also be performed by repeated and careful cross-plowings, following each by a slight hilling up with the hoe, and pulling out by hand any weeds that may be found too close to the plants to cut, and too large to cover in the hoeing.

All the varieties of tomato may be taken while green and kept in brine, or salted, for making up into pickles in the ordinary modes, as they are wanted through the year.

Tomato catsup is made by boiling the ripe fruit to a pulp,

which is then strained through a sieve that will keep out the skins and seeds ; and after being again thoroughly boiled, reducing it somewhat, adding salt and spice according to taste, it is cooled and bottled for use.

Either the apple or pear tomatoes make a pleasant preserve for immediate use, or for keeping if put in preserving cans. For this purpose, the fruit may be taken while green, or when about three fourths ripe. If the latter, boiling water is poured over them, and the skins are carefully taken off ; if the former, the skins are left on. Having the fruit prepared, add to each three pounds of it two quarts of water, one and a half pounds of sugar, one good-sized lemon, sliced, or a quarter ounce of green ginger, or both, and boil slowly till the sirup thickens.

To make what are known as "tomato figs," take the pear-shaped variety when nearly, but not quite ripe, and boil them as above directed for preserves, with the water, and sugar, and lemon or green ginger in the same proportions. When sufficiently boiled, take the tomatoes out of the sirup, and lay them singly upon flat dishes, and place them in the sun ; when partially dried, sprinkle finely-crushed sugar thinly over them, turning and sugaring them daily until they are sufficiently dried ; or, if difficulty arises from bad weather, the drying may be completed in an oven at a low heat. They may then be packed, and pressed closely into boxes lined with white paper, and, if thought needful, more sugar may be added.

For winter use, the ripe tomatoes may be stewed, and simply salted or fully seasoned, and kept in patent fruit-cans in the usual mode until wanted, when they are to be stewed afresh, and seasoned anew if desired.

TURNIP.

French, *Navét*.—German, *Rube*. *Steckrübe*.—Spanish, *Nabo*.

EARLY RED-TOP. EARLY DUTCH. EARLY STONE. LONG, OR TANKARD. YELLOW ABERDEEN. YELLOW GLOBE. RUSSIA, OR RUTA BAGA.

BRIEF DIRECTIONS.

Sow in shallow drills, twelve inches apart. Cover lightly,

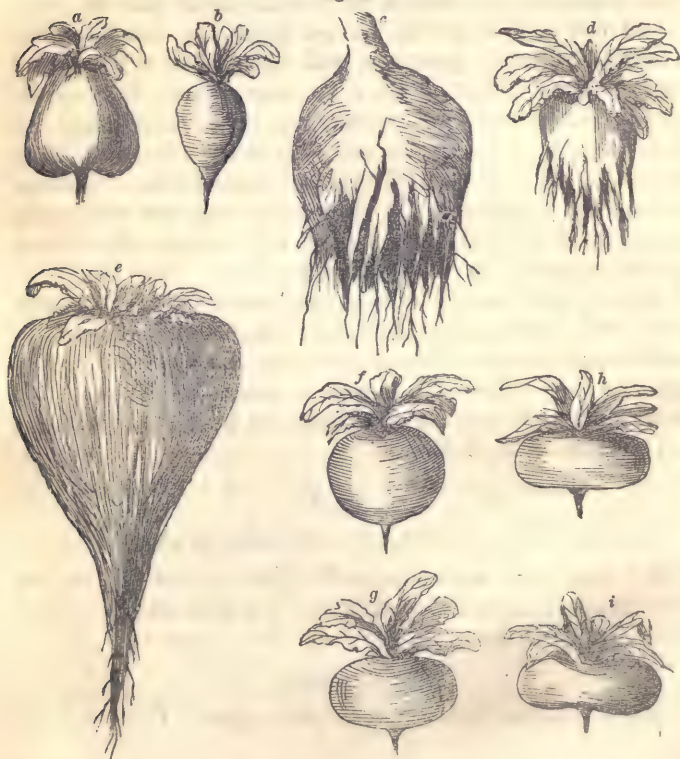
and if dry, give water. In garden culture hoe them at least once, thinning the plants to four or six inches.

Time : at the very earliest moment of spring if intended for summer use. If for winter, as late in the fall as possible, so that about eight weeks of cool moist weather may be allowed for their growth, or for ruta бага twelve weeks. If they are not hoed during their growth, they will require a little longer time to mature.

At New York, common turnips may be sown in March for summer, and August for winter use ; ruta бага in June or first half of July.

FORMS OF TURNIPS.

Fig. 80.



- a. Uncouth form, Dale's hybrid Turnip.
- b. Egg-formed Ruta Baga.
- c. Worthless Ruta Baga, long-necked and branch-rooted.
- d. Inferior heart-shaped Turnip.
- e. Superior heart-shaped Turnip.
- f. Globe-formed Turnip.
- g. Cheese-formed Turnip, or a "flattened spheroid."
- h. Flat-formed Turnip.
- i. Double concave form, as yellow Malta.

Of the kinds named above, the early red-top, sometimes called purple-top, the Aberdeen, and the Russia, or ruta бага, will meet all the ordinary demands of a family. The early Dutch and stone are good varieties, and with some persons the long, or tankard, recently sometimes called French, is a favorite; but the red-top is of the freest growth and of the best quality of white turnips, and will supply the table for summer use, and from early fall until New Year. The yellow globe, or Aberdeen, may succeed it until late in March, after which the Russia alone may be used until new vegetables come in.

Common turnips may be sown in drills from twelve to eighteen inches apart, or broadcast upon fine, light, well-prepared soil. In either case let the seed be but lightly raked in, and if the weather is very dry, give water, using an ordinary rose watering-pot. When sown very early or very late, water them occasionally in the course of their growth with liquid manure, or top-dress them with ash compost or some other stimulating application; hoe repeatedly, and thin them carefully to three or four inches apart.

With this treatment, the early kinds sometimes furnish good roots before the summer heat spoils them, or succeed well for winter use, though sown even as late as the beginning of September.

In moist and misty climates turnips may be sown to advantage in early spring, but in our climate it is seldom that spring-sown turnips are fit to eat. In general, they serve only for flavoring summer soup.

Russia turnip, or ruta бага, when sown in the garden and intended for family use, should not be sown earlier than from the first to the middle of July at New York and the North generally—say from two to four weeks earlier than the fall sowing of the common kinds, and should always be sown in drills, and carefully hastened in its growth by hoeing and top-dressing. See also Turnip Bug, page 102.

WATER CRESS.

French, *Cresson de Fontaine*.—German, *Wasser Kresse*. *Brunen Kresse*.—Spanish, *Berro*.

The water cress may be raised from seed; cuttings, or plants, sown or planted in the edge of a living spring or stream, where its roots may be ever so slightly protected by the water from the intense cold; or it may be sown or set in the narrow intervals of a floor or bed made with rough paving stones, over which a gentle shallow stream is made to flow. North of New York it may be thinly covered in winter, if found necessary, with straw, or salt hay, or evergreen brush.

It starts at the first opening of spring, and being gathered as soon as sufficiently grown, is the earliest warm aromatic salad seen in our markets.

It is highly esteemed, being not only agreeable to the taste of most persons, but also regarded as a valuable antiscorbutic, peculiarly suitable for spring use.

The brooklime (*Veronica Beccabunga*), a worthless plant, distinguishable by its ovate and flat leaf from the water cress, is sometimes mistaken for it.

ASSORTMENT OF SEEDS, ABOUT SUFFICIENT FOR A GARDEN OF MODERATE SIZE, SAY A QUARTER OF AN ACRE.

As garden seeds are extensively sold in "papers," I have given the ordinary equivalents of the respective weights and measures. It may be found occasionally useful to beginners.

Bush Beans of various kinds.....	3 pints= 6 papers.	Onion in varieties.....	2 oz. = 4 papers.
Pole Beans of various kinds.....	2 " = 6 "	Onion sets.....	1 pint.
Early Peas of various kinds.....	5 " =10 "	Lettuce in varieties.....	$\frac{1}{2}$ oz. = 2 "
Late Peas, various kinds	3 " = 6 "	Spinach.....	2 " = 4 "
Cucumbers ".....	1 oz. = 2 "	Dock.....	$\frac{1}{2}$ " = 1 "
Muskmelon.....	$\frac{1}{2}$ " = 1 "	Celery.....	$\frac{1}{2}$ " = 1 "
Watermelon.....	$\frac{1}{2}$ " = 1 "	Pepper.....	$\frac{1}{2}$ " = 1 "
Summer bush Squash..	1 " = 2 "	Egg-plant.....	$\frac{1}{2}$ " = 1 "
Winter ".....	$\frac{1}{2}$ " = 1 "	Tomato.....	$\frac{1}{2}$ " = 1 "
Pumpkin.....	$\frac{1}{2}$ " = 1 "	Salsafy.....	$\frac{1}{2}$ " = 2 "
Early Cabbage.....	$\frac{1}{2}$ " = 1 "	Okra.....	$\frac{1}{2}$ " = 1 "
Winter ".....	$\frac{1}{2}$ " = 2 "	Mustard.....	1 " = 2 "
Cauliflower, or Brocoli..	$\frac{1}{2}$ " = 1 "	Peppergrass.....	1 " = 2 "
Beets of various kinds..	2 " = 4 "	Nasturtium.....	$\frac{1}{2}$ " = 1 "
Carrots ".....	1 " = 3 "	Leek.....	$\frac{1}{2}$ " = 1 "
Parsnip ".....	1 " = 2 "	Parsley.....	$\frac{1}{2}$ " = 1 "
Turnips ".....	1 " = 2 "	Sage.....	1 " = 1 "
Radish in varieties.....	3 " = 6 "	Summer Savory.....	1 " = 1 "
		Sweet Basil.....	1 " = 1 "
		Sweet Marjoram.....	1 " = 1 "
		Thyme.....	1 " = 1 "

CHAPTER XII.

Fruits.—Effect of Soil, Climate.—Shape of, Color, Flavor, Specific Gravity.
—Fruit-trees ; selecting Varieties, bearing Qualities, new Kinds.

FRUITS.

“ Good for food, and pleasant to the eyes.”

FRUITS always commend themselves to the natural taste, and their free use in the ripe state, whether raw or cooked, is pleasant, economical, and highly conducive to health. In some fruits a simple statement of the grade of their quality is sufficient ; but in several of the more important classes, as apples and pears, there are general divisions which it is important to notice, as summer and winter fruits, sweet, subacid, vinous, sour, melting, buttery, firm, mealy, gritty, &c. ; and in plums and peaches, clings or freestones. Various persons prefer fruit with one or other of these peculiarities, according to diversity of taste, or for special seasons or uses : melting, buttery, subacid or sweet, and freestone fruits for eating out of hand ; clingstone, sour, and firm fruits for preserving—the sweet fruits preserved or stewed being usually flat, though occasionally a subacid fruit is found which, with little sugar, is yet lively, the acid developing with the process of cooking ; as also sour fruit, when cooked, is more acid than when raw.

Most of these peculiarities in fruits are modified by various causes, as soil, climate, &c., in some cases deteriorating good kinds till they become almost worthless.

EFFECT OF SOIL.

A wet and cold soil, whether it be poor or rich, tends to increase the rough acidity of fruits ; a warm, dry soil, on the other hand, naturally heightens the flavor, and limits and refines the acidity.

Fruits raised in very rich soil, other things being equal, are

larger, but less rich, both in flavor and saccharum, than the same fruits raised with less luxuriance of growth on poorer soil. Our Western apples are beautiful in appearance, but do not command the price of those raised upon the hills that border the Hudson, either in domestic or foreign markets. The vineyards of the hills, and not of the level and fertile valleys of France, make the richest qualities of wines.

EFFECT OF CLIMATE.

Speaking generally, fruits gradually increase in richness and variety as we proceed from the north southward to the tropics. But the natural boundaries of the various families of fruits are limited, having probably as their centre a line of perfection, of greater or less width, for each particular tribe, which, as we diverge from that line, deteriorates under our hand. As an illustration merely, we may assume the latitude of 42° to be the line of perfection for the apple, 38° or 40° for the pear and cherry, and 30° or 35° for the vine. But certain kinds of any given class of fruits are also better suited than others to the particular varieties of climate found within these natural boundaries, and we say therefore of one apple it is a Northern, and of another it is a Southern fruit, and we make lists of them as they are supposed to be suited to the colder or warmer regions of the zone to which the family belongs.

We may also conclude ordinarily that the varieties of fruits best suited to a given region will be those which have originated in it or in some other region of like location. The Newtown pippin, which is the chief of apples where it can be properly matured, attains its perfection only near the line of latitude in which it originated, and when exempted from the influence of a too cold or humid soil. The Rhode Island greening, lively and piquant in its proper latitude, becomes flat and worthless in a Southern climate.

As we bring varieties toward the central line of perfection from the North, the influence of the change of climate is similar to that of a single particularly long and warm summer in their native region, or of transfer to a warmer soil, or to a locality where the temperature is modified by a river or body of water, or

of a system of very open trimming, or of planting the individual tree in an especially warm exposure, all of which are merely temporary or local modifications of climate. But this change for the better in the character of the fruit is usually accompanied by another of a different kind. The fruit not only ripens higher, but it ripens earlier, and as ripeness is always the precursor of rottenness, it will not keep so well. The Rhode Island greening and the Baldwin, raised in Massachusetts, are less perishable than the same varieties raised in New Jersey. It is important to take this into account when we are transferring varieties to new localities, otherwise we may fail to secure in the fruit the very qualities for which we have esteemed it.

SHAPE OF FRUITS.

The form of fruits is seldom of much importance, but in apples it affords a general indication of quality. The flattened and globular, and the obtuse conical forms are mostly pretty close at the core, and all the very best varieties of apples belong to these forms. The long-shaped apples have generally large, open, "rattle-box" cores; and while many of them are distinguished by pleasant peculiarities of flavor, as the gilliflower, there are very few, if any, first-class fruits among them. Fruits of an oblique or one-sided form, as the Chandler (see p. 309), are apt to run defective on the shrunken side in seasons that may be even but slightly unfavorable, and, in general, all fruits with an irregular or disproportioned development of form are liable to similar imperfections.

COLOR.

Fruits with a large proportion of bright red, or with at least a full, deep blush cheek, or of a deep golden yellow color, always strike the eye as more beautiful, and find a readier market than others of only equal quality and less color.

FLAVOR.

Of the various flavors found in fruits of the same family, some seem to be produced simply by a happy combination of clear, pleasant acid, with a due proportion of sugar, and are

abiding, and suit all palates ; others are in the nature of an aroma or spiciness, which is well developed only in very favorable circumstances, and in most cases is so fugitive that it must be enjoyed at the very moment of perfect ripening, or it is lost, and in reference to which tastes vary greatly. Such may be chosen for special culture, but not for the general purposes of life or profits of business. For the effect of soil and climate upon flavor, see those heads.

SPECIFIC GRAVITY.

Other things being equal, the comparative value of any fruit may be instantly determined, like the value of gold, by its superior specific gravity, or "heft," as we say familiarly. This indicates with precision its richness in saccharum, and may guide the manufacturer of vinegar in his choice of fruits for this purpose, though for cooking or eating we need to inquire farther as to flavor, &c.

FRUIT-TREES.

SELECTING VARIETIES.

In making a selection of fruits, choose mainly from such varieties as are known to succeed in your own locality, either as having originated there or become wonted. If you seek to introduce improved varieties, never depend on their reputation in other localities, but study their intrinsic character. If you transfer the Boston russet or the Baldwin to New Jersey or Delaware merely with a view to home consumption, you may succeed ; but if with the idea of raising apples for shipping, you will be disappointed. If, however, you find in Canada or New England an apple of good color, shape, and heft, but indicating by its excess of acid that the season in those latitudes is not long enough to perfect it, you may move it southward with a probability amounting almost to certainty that you will obtain a valuable fruit.

Perhaps the general rule may be expressed thus : Fruits that ripen very late, or do not ripen at all in a given latitude, will improve by moving South ; and fruits that in a more southerly location ripen early, may be moved northward with-

out being injured. For the mode of producing and treating seedling fruits, see those heads, pages 194 and 204.

There is a difference in the period of blossoming of different varieties in the same orchard, which is sometimes due to inherent natural diversity, but often, also, is the effect of climate, the habit of the tree, formed in a warmer or colder latitude, adhering to it. Sometimes the season's crop is lost by the spring frost killing the too early blossoms of a southern tree, and at others injury is avoided and a crop gained by the tardy blossoming of a northern one.

It is sometimes worth while to choose kinds that may be readily identified by the peculiar appearance of the young branches, as the snow peach by its white shoots, the Napoleon pear by its slate color, and the Dix by its slender willowy yellow ones, and the Bergamotte Suisse by its striped bark, with which the stripes upon the fruit have a general correspondence. It is, however, much more important to attend to the mode of growth which distinguishes each particular variety you propose to plant, as whether its habit be erect or drooping; whether, like the peach, it throw out its branches at acute angles, with a weak joint, and is therefore liable to be split by winds or broken down by its crop of fruit, or at obtuse angles, or horizontally, as the Rhode Island greening and Gravenstein among apples, and the hickory among forest trees, and is therefore strong to bear both wind and fruit. Also, whether it has a habit of forming a snug, well-shaped head, as the Seckel or Lodge pears, from which the fruit may be gathered easily, or long, straggling, or upright branches, which can not be climbed, and can scarcely be reached by a ladder, and for which the fruit-gatherer becomes necessary.

BEARING QUALITIES.

Certain kinds are better bearers than others under equally favorable circumstances, as among apples the Rhode Island greening is superior in this respect to the Pound sweet or the Vanderveer. Certain other varieties always bear heavily, but only in alternate years, as the Jersey sweeting and the common or Poughkeepsie russeting. In some trees the fruit spurs,

or bunches of blossom buds are thrown out from the older growth, while in other varieties the blossoms are produced chiefly from the terminal buds of young shoots, upon which, at maturity, the fruit dangles.

Generally, the trees of heavy-bearing varieties are not long lived, being either constitutionally feeble or exhausted by excessive crops, or both.

It will be found best, on the whole, to choose varieties that bear moderately, and of which the fruit is neither so small as to be tedious in the gathering, nor so large as to expose it to be swept off by winds, though, in reference to the russet and Jersey sweeting named above, special peculiarities will always secure them a place in the orchard, in spite of their comparatively early decay. It may also be added that the habit of heavy alternate bearing may be changed in the youth of the tree by perseveringly stripping it of blossoms in the bearing year until it is forced into blossoming moderately every season, or only half the tree may be so disciplined, or one side may be grafted with another variety of diverse habit.

PRODUCTION OF NEW FRUITS, &c.

From the knowledge we possess, it seems probable that the kinds of fruit, as well as individual trees, have but a limited period of healthful growth and productiveness, and hence new kinds become desirable.

In reference to fruits, the theory has been proposed that, in attempting to raise improved varieties of fruits from seed, we should select for intermixture, not individuals of the very best known varieties, but those of a somewhat inferior grade which are in process of amelioration, thus running them, as it were, on an independent line upward from the original base stock.

This theory may be good, but it does not look so. We may assume that in each family of fruits there is a point of excellence beyond which human skill in its culture will not be able to carry it. If our best-known varieties have already attained to this perfection in their various kinds, the most direct course would seem to be to reproduce them anew from seed as nearly

like themselves as possible. If they have not attained that point they may be still progressing; but if they have simply arrived at the acmé of their individual character, and not constituting standards for their class, then it becomes difficult to explain why the incessant efforts of the last half century have not produced an apple superior to the Newtown pippin, a pear as finely flavored as the Seckel, or a plum equal to the old green gage, whose seedlings, raised haphazard through the country, though inferior to their parent, yet occupy almost alone the wide space lying between it and all other varieties of plum. My readers may pursue either track at their pleasure. See *Fertilization*, page 74.

CHAPTER XIII.

Propagation of Fruit-trees by Seeds, Cuttings, Layers, &c. — Various Stocks for Fruit-trees.

PROPAGATION OF FRUIT-TREES.

BY SEEDS.

See "Seedling Stocks," page 204.

BY CUTTINGS.

Currants, gooseberries, grape-vines, and quinces are often raised from cuttings, and it is quite possible to raise apples, pears, and other fruits in the same way.

Certain fruit-trees, as some varieties of the apple, indicate a disposition to root by pushing out bunches or ganglions of half-formed or inchoate buds from the plain body of the stem, and from these, in due time, young shoots proceed. Cuttings from such varieties strike readily. In certain circumstances a similar result seems forced, as when the young green growth feathers the whole length of the rough bark of the body of a felled pitch-pine, or an equally unpromising locust post in a lumber-yard.

It is not, however, desirable to raise fruit-trees in this manner. The heavier trees, when raised from cuttings, never make

enough strong roots to hold them securely ; they are generally also much longer in attaining size than those raised from seed, or grafted on seedling stocks.

Cuttings of currants, gooseberries, etc., are made from one or more buds of the last year's growth, and should not be taken from very near the point of the young shoots, but so far down as to secure some firmness in the wood, and little pith. In general, also, it is better to take them from the horizontal branches which issue from near the root than from the central upright growth.

BUD CUTTINGS.

Fig. 81.

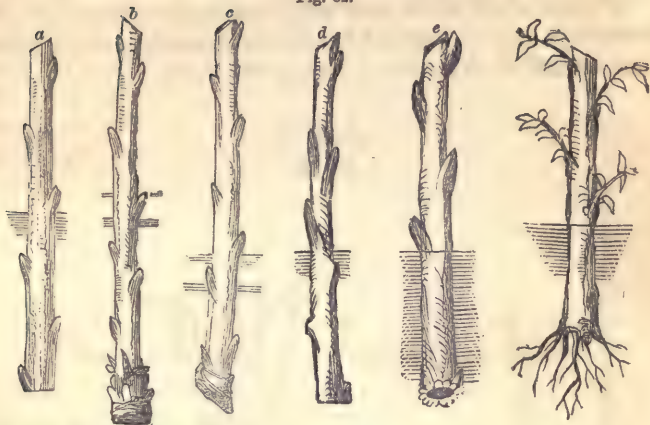


a. Bud Cutting with sealed ends.
b. Bud Cutting divided lengthwise.

A bud cutting consists of a single bud, with an inch or so of the stem left on each side of it, which may be sealed at the ends with pitch or grafting composition, as Fig. 81 *a*, though this is not essential ; or it may be divided lengthwise, as shown above, Fig. 81 *b*. Three or four of these may be set, with the bud in position to start upward, about an inch deep, around the inside edge of a quart garden-pot in rich earth, or each bud may be put singly into a half-pint pot, which is preferable. Early in the season place them in a gentle hot bed to start them. After they begin to grow and the weather becomes warm, the glass may be removed, and, if they are carefully watered and shaded, it will be safe to set them out in the open ground in June, or they can be transferred to larger pots, as may be desired. Single bud cuttings were largely used some years ago for producing *morus multicaulis*, but are now resorted to almost exclusively for increasing rapidly choice varieties of the grape.

BRANCH CUTTINGS.

Fig. 82.



- a.* An ordinary woody cutting.
b. A woody cutting with half an inch of last year's wood at the butt.
c. A cutting slipped off from the main stem, having the butt smoothly trimmed, commonly called a "slip."
d. A currant cutting with the underground buds cut off at the shoulder.
e. Cutting with its "callous" formed at the butt preparatory to rooting.
f. Cutting with roots and leaves put forth, ready for setting out.

Branch cuttings should have five or more buds, or three if very long jointed, and must be smoothly cut with a sharp knife just below and close by the lower bud (Fig. 82 *a*). If a small piece of the old wood can be left at the butt of the cutting it will more certainly succeed (Fig. 82 *b*). This object is equally secured by slipping off the cutting from its main stem and trimming it smoothly, and shortening it as in Fig. 82 *c*.

To prevent a habit of throwing up stem suckers, to which currants and gooseberries especially are liable, the buds may be cut off or broken clean out with the heart from that portion of the cutting which is covered in planting, leaving the bud-shoulder and bark of the branch uninjured, Fig. 82 *d*. Fig. 82 *e* and *f* show the incipient and progressive growth of cuttings. In general, cuttings should be planted so as to leave at discretion from one to three buds above ground. (See also p. 438.) When

made in the fall, they should be very carefully planted, and mulched between the rows late in the season, which will both promote safe wintering, and supply a needful shade in spring.

Cuttings of all kinds, that may have become dried even to shriveling, may be restored by carefully soaking them before planting, and shading and watering afterward.

LAYERING.

Fig. 83.



- a.* Layer sprouts, the heavier one too strong for layering, unless toward its extremity.
- b.* Ordinary layering, with the tongues cut too sharp.
- c.* Ordinary layering, with the tongues cut nearly upon the upper side of the sprout, and nibbed close to the bud.
- d.* Common layering on a heavy sprout, rendered manageable by a cut on the upper curve.

Layers are properly branch cuttings, planted without being entirely severed from the parent plant, and, like ordinary branch cuttings, they are usually made from sprouts of last year's growth. To prepare a woody bush or plant for layering, let all very weak, or forked, and also overgrown sprouts be cut away, leaving only such as have pretty fully developed buds down to within six or eight inches of the ground. If the growth has been so strong that the buds upon a foot or more of the lower end of the sprout are small and obscure, it is seldom worth while to layer it, unless it be toward the middle or the upper extremity. (See Fig. 83 *a*.) The sprouts you propose to layer must then be trimmed clear of all side shoots and leaves as far up as it will be requisite to bury them. Having the bush or plant thus trimmed, dig the earth carefully around it, breaking it fine, and mixing rich mould with it, and sand if the soil be heavy, leaving the whole, when finished, very slightly raised above the natural level. Next, with a shingle five or six inches wide, or with the spade, make an open slit in the earth to receive the layer. At such distance from the butt of the sprout as will permit of its being bent down into the ground, which is generally eight or ten inches, a cut is made about half through the branch, immediately below and close to a bud, and the knife being then carefully turned upward, a slit is made of about an inch in length, which is termed tongueing it, and the tongue, when cut, should have its end not thin and sloping in, as shown in Fig. 83 *b*, but rather square or clubbed, as Fig. 83 *c*, for which purpose, if needful, it must be nibbed.

It is then carefully bent down, with a slightly twisting motion in the process, to prevent snapping it off and to open it, and being firmly pinned down with a hooked stick, Fig. 83 *b*, *d*, it may be covered with from two to four inches of earth, cautiously pressing it downward and around the layer, which should then, like ordinary branch cuttings, be shortened to one or two buds above the surface. It will be found in practice that there is much less danger of layers snapping off when the tongue is cut nearly upon the upper or inner side of the sprout, in which case, by slightly twisting it, the bark side of the sprout is brought underneath, while the lower end of the tongue

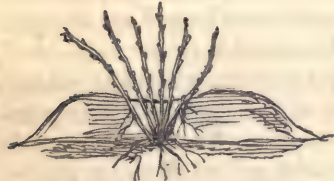
slides off the cut into a position almost perpendicular. (See Fig. 83 *c.*) If the sprout to be layered prove stubborn, a slight cut on the upper side, near the butt and toward the parent tree, will weaken its resistance, and enable you to bend and pin it to its proper place, and will also probably promote the rooting of the layer, unless it be made more than half through the sprout, which should be avoided. (See Fig. 83 *d.*)

All tongued layers require much care in removing them from the parent plant, to avoid splitting them up from the tongue. Generally, all the roots will be found to have grown from the tongue-bud, and a little rashness may leave you a rootless plant. (See Fig. 88, p. 203.)

Besides tonguing, other modes of attaining the same end are sometimes used, as notching the sprout about half through immediately below a bud. Sometimes tonguing is combined with this, and in inexperienced hands the notching will render it easier to form the tongue properly. Banding tightly with wire, piercing with an awl or knife, girdling a narrow space, or merely twisting the shoot just beyond the bud from which the roots are expected to push, are all resorted to, while some plants, as the grape-vine, root freely if the branches are simply fastened down and covered lightly with earth.

HILL LAYERING.

Fig. 84.



This is a process often resorted to for propagating free-rooting woody plants, as the quince, certain varieties of the apple, and some forest trees. The young shoots are prepared by trimming, as directed above for common layer-

ing, but may be tongued or not, according to the character of the tree, a flattened or dished hill of earth, six or eight inches high, being made about them, as shown in the figure. All layers are benefited by being mulched, but hill layers especially should be thus protected and regularly watered, dressing them occasionally with weak liquid manure.

For hill layering by simple banking up, see "Offshoots," p. 203.

STOCKS.

For the propagation of fruits by grafting or budding, stocks are required, and it is of great importance that they be stocks on which the fruit we graft or bud will not only grow, but last and grow healthfully to maturity. Grafts or buds may sometimes grow for a year or two upon very incongruous stocks, as the peach upon the wild cherry, &c., and the curious may try to ascertain how far these incongruities, and devices to counterfeit them, which are so famous in Chinese and Italian gardening, may be pushed. The ancients as well as the moderns amused themselves with such experiments, and have left us the record of their very useless labors. A different course must be pursued if we seek fruits for use or profit.

Stocks should be of kindred species with the graft or bud that is united to them, or at least of the same natural order, as pear and quince, or thorn; plum and peach, &c.

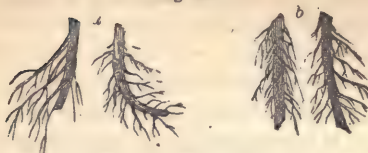
Unless for the purpose of dwarfing, the stock should always, if possible, be of as free growth as the kind which is grafted or budded upon it; and if this can not be attained, then the grafting or budding should be performed close to the ground, so that when the tree is transplanted the head of the stock may be set entirely under ground, otherwise the grafted kind will largely overgrow the stock at the point of junction, and probably induce disease and premature decay.

In many parts of our country there is difficulty in this matter in respect to stocks for plums, but few of our common kinds, except the Mussel or Horse plum, being free growers, while this is so liable to the black knot as to render it nearly valueless, in addition to which it is almost always raised from layers, which do not root like seedlings.

ROOT STOCKS.

Pieces of the roots of mature trees are sometimes used for grafting, being cut into lengths for this purpose (Fig. 85 a), and set out after the grafting is performed, an expedient which

Fig. 85.



a. A pair of root stocks, pieces of root from mature trees.

b. A pair of root stocks, pieces of the tap-root of one or two-year-old seedlings.

should never be resorted to; such stocks generally make only a one-sided growth of root, and, as in the case of sucker stocks, leave the tree to the mercy of the wind. It requires symmetrical roots to sustain a tree in erect and healthful growth (see Fig. 89 *b*, page 204). Neither offshoot, nor sucker, nor root stock will furnish these, unless, *possibly*, the tap-root of a seedling cut into lengths, which, perhaps, may be expected to retain throughout its growth the natural habit of its seedling form (Fig. 85 *b*).

ROOT SUCKER STOCKS.

Fig. 86.



Runner roots and their suckers, with feeble hair-like rootlets.

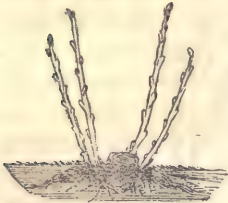
ROOT SUCKERS are often used for stocks. These differ from offshoots or stem suckers in that they are thrown up from peculiar runner-roots, which do not supply food to the tree, but rather abstract it to support the young brood they put forth. This habit of throwing up suckers is transmitted to the sucker, and when it is used as a stock the tree becomes a nuisance, not only generally failing to form sufficient root to support itself, but, instead of this, spreading around it a young forest of

worthless growth (Fig. 86). I have now in my eye such a tree, obtained from one of the best nurseries in the state, which, though not thicker than a man's arm, requires bracing against the wind, while its root suckers are spread over a circle of sixty feet diameter.

OFFSHOOTS, OR STEM SUCKER STOCKS.

Many kinds of trees have a habit of throwing out young shoots from the stem at the butt, or just above it, especially when the upper growth is checked or cut off. In certain kinds, these young shoots, if touching the earth, root freely, and of this habit advantage is sometimes taken to procure such for stocks by banking the earth around the tree. They are known as offshoots, or stem suckers (Fig. 87).

Fig. 87.



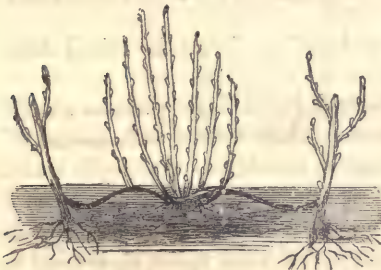
Offshoots from the stem collar putting forth rootlets.

They are really untongued hill layers, and have, in general, the disadvantages of layer stocks.

LAYER STOCKS.

Stocks, particularly of cherry and plum, and the dwarf apples, are extensively raised by layers. For this purpose the tree is cut off close to the ground, so as to induce sprouting from the collar. In a few years it loses entirely the character of a stemmed tree, and becomes a mere bunch of sprouts, which, as they

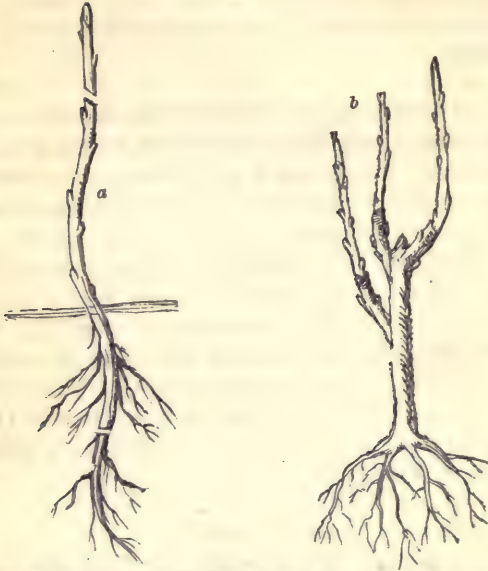
Fig. 88.



are renewed from year to year, are trimmed out and layered (Fig. 88). They are of certain well-known varieties, as the Mazzard cherry, the Mussel or Horse plum, and the Paradise apple, &c., and make tolerable stocks, but are in measure defective in root power, being inclined to one-sidedness (see Fig. 88), and often also somewhat disposed to produce root suckers.

SEEDLING STOCKS.

Fig. 89.



a. Seedling stock of one year's growth, shortened and ready for transplanting.

b. A well-rooted seedling stock, suitable for cleft-grafting, with its third year's growth, having been once transplanted.

All stocks for grafting or budding should be raised from seed.

The various fruit-seeds desired for producing stocks should be collected from healthy trees in their season, and, instead of being stored dry, as garden-seeds, should be mixed with earth, and kept either in a cellar or out of doors, the latter being preferable where it can be done with safety. The housewife's practice of placing peach-pits under a flat stone in the fall is perfect so far as relates to the fulfillment of the conditions necessary or desirable to the healthful preservation of all fruit-seeds through the winter. All tree-seeds may be advantageously sown in the fall if they can be secured from vermin, unless for special reasons it is preferred to keep them until spring.

In the case of apples and pears it is better to obtain seed for raising stocks from the more hardy inferior varieties than from choice kinds. Pear seedlings, being liable to injury from the first winter's cold, should either be covered with earth in the fall, or taken up and kept in a cellar, and set out again in spring, in which case they may be multiplied by setting out separately the pieces of roots obtained in shortening, Fig. 89 *a*, allowing their upper ends just to appear above the surface, and settling the earth to them firmly, and very thinly mulching them.

Cherries also may be raised from the common black or Mazzard, or the honey cherry.

Plums which are to be used as stocks may be of any kinds that have a moderately free growth. The plum is often used in unfavorable soils and climates as a stock for the peach as well as for the apricot and plum, and in our more favorable localities the plum and apricot may be safely and advantageously worked upon the peach, at least if it be budded low, so that the whole of the stock may be covered when it is transplanted. At a short distance from the plum-tree referred to above, as upon a sucker stock, stand two others which were planted at the same time, some twelve years ago, one of them being budded on a seedling plum stock, and the other upon peach. Both appear thoroughly and equally vigorous. The peach as a stock for the plum would therefore seem worthy of careful and repeated trial.

Peach stocks, whether for plum or peach propagation, should not be raised from pits of unhealthy fruit, but from trees that are not in any way diseased, obtained either by careful selection in your own locality, or from regions not yet invaded by the prevailing maladies of the peach-tree. As these are usually budded in the seed-row, it might be well to start the pits in the spring before planting them, and nip the young tap-root an inch or two. See page 365. The bitter almond, raised in the same manner, is sometimes used as a stock for the peach, particularly by the French, being supposed to render it more fruitful, probably by slightly dwarfing it. All other seedling stocks should be transplanted at one, or, at the most, two years old, the roots being shortened to four or six inches, and the

tops cut back in proportion (Fig. 89 *a*). If their multiplication is desired, they may be treated as above directed for seedling pears, and, being assorted into their several sizes, they may be set in the home nursery, or at once where they are intended to stand permanently, to be grafted or budded after they have made one or two seasons' additional growth; but in general, for home use, it is better to plant only the main stock, properly shortened and trimmed, allowing this to attain a diameter of from a half to three quarters of an inch, or a little more, before grafting it (see Fig. 89 *b*). From such stocks, with proper after-treatment, you may expect a growth of five, six, or eight feet the first season from the graft or bud.

STOCKS FOR WEAK OR IRREGULAR GROWERS.

There are varieties of almost every kind of fruit, which, though valuable, do not grow vigorously, and such it is always desirable to graft upon strong growing stocks at the height at which it is intended to form the head.

There are also certain kinds, particularly of plums and pears, that have an irregular habit of growth, not making good stems for themselves, yet requiring strong stocks. These, when seedlings of sufficient strength can not be procured, are provided for by grafting a strong, upright-growing, cultivated variety upon a common stock near the ground, as above directed, upon which, when it has attained the desired height, the irregular grower is grafted. This process is known as double, or, more properly, "intermediary" grafting, and is also sometimes adopted in raising dwarfed pears by first grafting a familiar variety upon the quince, and regrafting this with a kind that would not grow if grafted directly upon that stock.

DWARFING STOCKS.

For special purposes, particularly to enable amateurs to enlarge their collection of varieties of fruit upon a limited space, and to hasten the period of fruiting, strong growing varieties of fruit-trees, or those kinds which, though vigorous, are naturally slow in attaining fruitful maturity, are grafted or budded upon certain stocks of comparatively diminutive growth,

by which they are dwarfed, and a tendency to earlier, and, in some cases, to superior fruiting is induced ; or rather, perhaps, we should say that, in climates unsuited to certain varieties, when grown upon strong seedling stocks, dwarfing affords us aid by hastening the maturity of the fruit.

The illustration of this with which we are most familiar is that of the pear worked upon the Angers and other free-growing varieties of quince stock. It is also sometimes grafted upon the mountain ash or the hawthorn, but the quince stock is the best and most generally reliable.

For dwarfing the apple, small growing varieties, known as the Doucain and Paradise stocks, are used.

Plums are sometimes, but rarely, grafted for this purpose upon the smaller varieties of plum, the damson, the winter damson or bullace, and the sloe, etc.

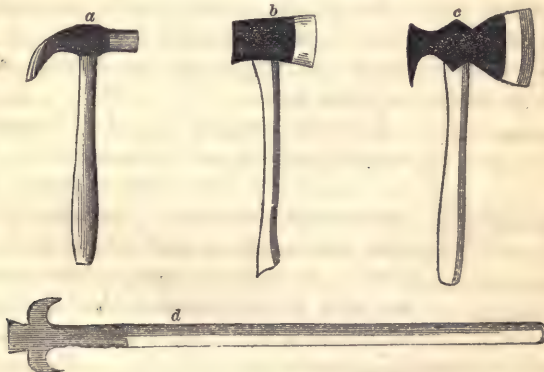
With the same view, peaches are sometimes budded on the small, double-flowering almond, to be fruited in pots.

CHAPTER XIV.

Implements for Pruning, Budding, and Grafting.

IMPLEMENTS FOR PRUNING, BUDDING, GRAFTING, &c.

Fig. 90.



a. Hammer.
b. Half Axe.

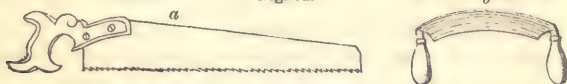
c. Hatchet.
d. Pruning Chisel.

The hammer, Fig. 90 *a*, is of the common form, with steel face and claws.

The half axe, Fig. 90 *b*, and hatchet, Fig. 90 *c*, for use among trees and shrubs, are of the forms in common use, and may be heavier or lighter, to suit the arm that is to work with them.

The pruning chisel may be either a common socket chisel of the desired width, or it may be made with a hooked knife attached for cutting small sprouts from the limbs, as shown above, Fig. 90 *d*. The handle should be of light but stiff wood, and may be eight or ten feet long, or may be formed of joints, so as to vary the length. It will cut off a pretty smart branch by the mere force of the hand, and still larger ones by the use of a mallet to drive it.

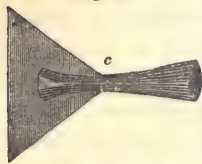
Fig. 91.

*a.* Pruning Saw. *b.* Drawing-knife.

The pruning saw, called also "grafting saw" (Fig. 91 *a*), should be eighteen or twenty inches long in the blade, and a little narrower and stiffer than an ordinary carpenter's saw, with a pretty wide set, to give it clear way through the green wood.

The drawing-knife, Fig. 91 *b*, which should always be used after the saw, unless the pruning-knife is made to serve the purpose, may be a common small straight drawing-knife, but will be found more convenient for its purposes if made with a curved edge, as shown in the figure.

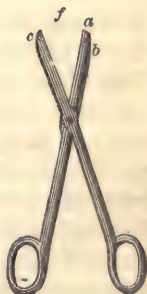
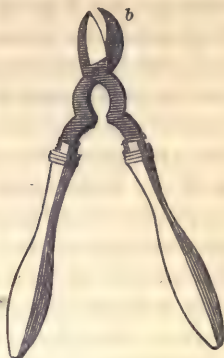
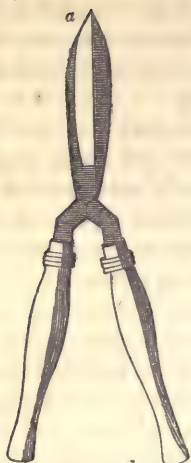
Fig. 91.

*c.* Tree Scraper.

The tree scraper, Fig. 91 *c*, is used for dressing off the dead bark, moss, &c., from the bodies and large limbs of trees. It is the common ship scraper, furnished with a long handle, and applied to use in the orchard. A worn-out goose-necked garden hoe may be used instead, the blade being set out to a right angle with the neck, so that it will scrape, and not cut.

SHEARS, &c.

Fig. 92.

*a.* Dressing Shears.*b.* Large Pruning Shears.*c.* Medium Pruning Shears.*d.* Small Pruning Shears.*e.* Grape Scissors.*f.* Flower or Seed Scissors.

The dressing shears, Fig. 92 *a*, are large and strongly-made shears, of various sizes and fashions, with equal blades and diverging wooden handles, used chiefly for dressing box edging, and occasionally shrubbery. They are also sometimes used for dressing live fences, and on this account are also called hedge shears.

The pruning shears, Fig. 92 *b*, are strongly-made scissors, with one very short blade, and a beak or finger, with handles

long enough to give so much power that a branch or tree of an inch in diameter may be easily cut off with them.

The medium size, Fig. 92 *c*, are intended for ordinary pruning. They are of the best and simplest construction, the handles opening by a stout spring, and being held together, when not in use, by a small smooth wire loop.

The smaller size (Fig. 92 *d*) may be used with or without a spring, and are intended for light shrub and flower pruning.

Those of the larger sizes are usually made with a sliding joint or movable centre, to give smoothness to the cut, and are sometimes fixed upon a pole, with a rope attached to the lever handle, for pruning high trees or cutting scions.

The beak or finger of pruning shears is commonly made of equal thickness throughout, with its upper edge almost square, and being always held outside of the cut, it prevents the yielding of the branch, and thus forms a strong brace against the action of the blade. If regularly beveled from back to edge, leaving the latter from one sixteenth to one eighth of an inch in thickness, there would be no loss of strength, with a great saving of power, and consequent relief to the hand in working.

They are all efficient instruments in pruning, being especially convenient and useful for shortening and thinning thorny shrubs, and in all rough trimming. An expert with the pruning knife will seldom be inclined to use the shears; their cut is not so clean as that of a good knife, and when they are at all dull there is a degree of bruising in the operation; but they are safer in inexperienced hands, since, in all ordinary work, it is only necessary to have strong fingers, and to understand that the blade, and not the beak, must be held next to the tree in cutting off its branch, and the greenest hand can use the shears.

The grape scissors, Fig. 92 *e*, are common small sharp-pointed and rather long-bladed scissors, used for thinning the grapes when crowding upon their bunches, and for various other delicate operations of the fancy cultivator.

The seed or flower scissors, Fig. 92 *f*, combine the operations of cutting and holding. They are small round-pointed scissors, with one proper blade (*a*), along the outer edge of which runs a small bar or plate (*b*), against which the straight, keen-

angled beak or finger (*c*) catches, and presses the stem of the head or bud when cut off. They are convenient in gathering flowers that have to be reached after, or the seeds of *Phlox Drummondii*, and other plants where there is danger that any jar in plucking one head may scatter the seeds of others.

THE FRUIT-GATHERER.

Fig. 93.



The fruit-gatherer is an instrument for securing the few extra-fine fruit which are often found upon the extremities of limbs, out of the reach of ordinary hand-picking. There are several kinds, but the accompanying figure shows one of simple form, which any tin-worker can make, and which, when rigged upon a single or jointed pole, with a little cotton batt or other soft material in it, will gather the scattered fruit quickly and safely.

BUDDING KNIFE.

Fig. 94.



The budding knife has a flat bone handle, which is usually made with a rounded end, and the blade is often straight-edged and sharp pointed. The rounded, recurved blade and the square-ended handle, with the outer corner not too sharp, and a small, smooth, dull notch in the inner one, to aid, if needful, in pressing the bud downward beneath the bark, will be found very superior in actual operations, especially where rapid work is desired (Fig. 94 *a*). The smaller and still more obtuse-formed blade, Fig. 94 *b*, is also well adapted; this generally has a common round handle, with a flat bone end inserted.

PRUNING KNIFE.

The pruner is a strongly-made knife, clasp or otherwise, the blade of which is usually made about an inch

Fig. 95.



broad, and from two and a half to three inches long. The edge should have a fair sweeping inward curve from heel to point, as shown in the figure (95). The handle, if small or twisted, is apt to cramp or strain the hand by continuous use; it should therefore be large, and bent and set so as to lie fair in the hand, and balance. As these knives are commonly made, the point is too much hooked, so that they almost invariably snap, and have to be ground up again, which generally spoils the knife for some of its special and most delicate uses, though it converts it into an excellent splitter or stock knife.

STOCK KNIFE.

Fig. 96.



This is a short, strong knife, intended for splitting stocks of ordinary size and opening the cleft while inserting the graft, thus saving the edge of the grafter. It may also be used instead of the pruner for heading down stocks.

GRAFTING KNIFE.

Fig. 97.



The grafter, or, more properly, the graft-cutter, should have a rather long, light blade, its point being set a little forward, but with a perfectly straight edge.

If it is used both for cutting the grafts and splitting the stocks it will require to be rather stronger, and must be carefully handled, using it near the point for cutting and the heel for splitting.

It is used for cutting the various graft wedges in all the modes of grafting, and its edge should be kept clear and keen as a razor.

Grafting may be well performed with any good straight-edged knife, but it is better to have two, the one for cutting the graft, which may be light, and must be kept as thoroughly sharpened as a razor or surgical instrument; the other, for splitting the stock, should be stout, and its edge kept smooth and in good order. When large stocks are split it is done with the grafting tool (Fig. 99), the edge of which should also be kept in first-rate order.

When cleft-grafting is to be performed on a large number of moderate-sized stocks before planting, a simple machine knife may be used for splitting them, the stock being held with the left hand in a groove immediately below the knife, the lever handle of which is raised by a spring, and brought down by pressure of the hand or foot, and the stock split precisely to the extent desired, the knife, which is curved backward, entering the side of the stock gradually from heel to point, so that the split is almost always smooth.

See also Stock Splitter, Fig. 100, p. 215.

There is also a machine for cutting the graft-wedge ready for insertion, which does its work with rapidity and neatness. It is doubtful, however, whether its uniformity of cut may not seriously interfere with that judicious adaptation of the wedge to the split which enables us to match the bark of graft and stock throughout almost or quite the whole length of the cut, in which, in connection with the keeping a perfectly smooth, keen edge upon your knife, and the neat, "slick," expert use of it in making the various cuts, lies the whole secret of success in grafting.

GRAFTING STILETTO.

Fig. 98.



The stiletto, Fig. 98, is a small instrument a few inches long and about a quarter of an inch in diameter, the lower end of which is fashioned as a rather long, tapering; half-round wedge, corresponding in form, and, as near as may be, in size

with the graft-wedge to be inserted in the opening which it prepares. It is intended exclusively for crown grafting, *which see*, and may be of steel, or bone, or hard wood; or may be made on the spur of the occasion from a green scion. It may have a pocket-case, or simply a loop by which it may be hung upon a twig or button. A goldsmith's bur-nisher of suitable size, costing twenty-five to fifty cents, may be used as a substitute if more readily obtainable.

GRAFTING TOOL.

Fig. 99.



The grafting tool, as shown in Fig. 99, is formed of a small bar of steel from twelve to fifteen inches long, half an inch wide, and rather over a quarter of an inch thick, one end being drawn so as to make it a little lighter than the other. A short wedge is formed upon each end for use in opening the cleft while inserting the graft; that at the heavier end is abruptly bent backward at a right angle to the knife, the lighter end being curved in the opposite direction sufficiently to allow of the tool being hung over a branch by it. The knife, which is formed simply by forging out the bar near its heavy end to about two inches width, may be made larger or smaller, but four inches may be regarded as a good size, the edge having a curve equal to the sweep of an eight-inch circle. It should be forged thicker at the middle than the ends, making both its sides slightly and equally convex. The back of it should be beveled to about half of its full thickness, so that its battered edges, after much use, may not tear the crown of the stock when driven into it.

This is a perfectly satisfactory instrument for use among large stocks and limbs, if they are split at all, but for such the simpler process of crown grafting with the use of the stiletto is greatly preferable. See page 233.

STOCK SPLITTER.

Fig. 100.



The stock splitter, Fig. 100, is formed of a stout wooden handle and grooved head-piece (a), the latter either a simple extension of the former or set at a more or less obtuse angle to it, combined upon an iron pivot with an iron handle of the same length, terminated by a knife of pretty thin steel (b), which works directly toward, but does not touch the inner face of the groove.

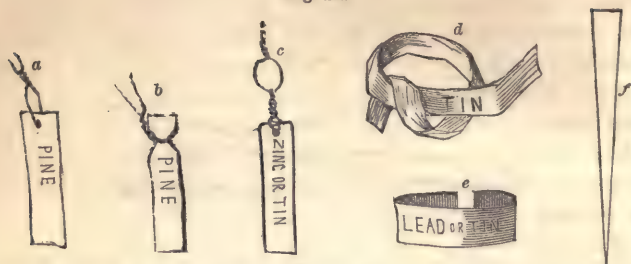
The edge of the knife should be gradually curved backward, and perhaps the addition of a small slide in the joint would farther improve it. In working this implement the wooden groove is placed against the back of the stock so far down as the operator may desire to extend the cut, and the cleft is made in an instant by pressure upon the outer end of the iron handle. It is sometimes used at the same time for heading down the stocks, but this is of doubtful expediency, in view of the importance of keeping its edge in fine order.

LABELS.

BAND LABELS.

Labels may be made with small pieces of pine, about one third of an inch thick, or like the thick end of a good shingle. A small block of straight-grained pine, four inches square and an inch thick, will make a dozen of them; and if a small hole be first bored through it, about half an inch from the end, each label, as it is split off, will be ready for wiring (101 a); or, if preferred, the boring may be omitted, and each may be notched and the wire twisted round it (101 b). These should be smoothed at least on one side, and painted with white lead. Upon this the name or number should be written legibly with

Fig. 101.



a rather soft pencil, and the label be then fastened to the tree with copper wire, about No. 18, or lead wire of a little larger size, being careful not to set the wire tightly upon the tree, but making allowance for growth.

Metallic labels may be made of zinc, or lead, or tin, which may be punched and wired to the tree, as 101 c. If zinc is used, it may be written on with the following mixture: Take two drachms of sal ammoniac, two drachms of verdigris, one drachm of lampblack, and two and a half ounces of water; mix carefully in a mortar with a small portion of the water, then add the rest and bottle it. Keep it well corked and sealed when not wanted, and shake it well before using it. Whatever metal is used, however, it is much better to stamp the name or number upon it with a punch. A set of letters and numbers, of steel, may be bought for three or four dollars, which will last a lifetime; or cast brass, or pot metal, or iron letters and numbers, which will punch the labels almost as well, may be obtained at a cheaper rate. If lead, or even tin, is used, common cast-off type from the printers will punch it satisfactorily, though for the latter brass or steel types are better.

A single line drawn upon the metal will enable any one to keep the letters in a proper position, and when finished, the strip can be flattened again with a wooden mallet or block. Perhaps the best labels for growing or large trees may be made with strips of tin or lead, the latter being best on the whole, from half an inch to two inches wide, and of any necessary length, upon one end of which the name is to be punched as above directed, and the other, being passed around the tree as

a band, and folded once over, will form a slack loop, in which the band will slip easily with the enlarging growth of the tree (101 *d*); or it may be made as a simple band or bracelet (as 101 *e*), with the ends overlapping or not, at discretion. Its own strength will keep it in place, and it can be read even when placed at a considerable height. All danger from cutting in will thus be avoided, and a permanent and legible label be secured.

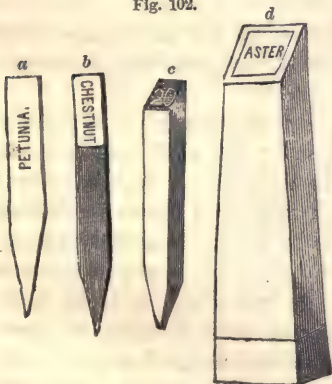
For small plants or shrubs, 101 *f* may be used, being punched with smaller letters, or, if made of zinc, written upon, and coiled as 101 *d e*; or it may be used as a stake label, instead of 102 *a*, for pot plants or flower-plots in the garden, &c.

All labels should be examined annually, and, if necessary, renewed or freshly painted. For trees and shrubs, however, labels alone ought not to be depended on, but every cultivator of these should prepare in a book diagrams of his several plots or orchards, upon which the position and name of each tree must be designated clearly and with precision.

STAKE LABELS.

Stake labels may be made of metal, as 101 *f*, or of strips of shingle for small articles, pots, &c. (102 *a*), and of locust, or chestnut, or cedar, or cypress,

Fig. 102.



or pitch pine, for larger ones (102 *b*). These should be about an inch and a half square, and full two feet long, smoothed, and painted, and written on, as above directed, or marked by burning in with a branding-iron, or numbered with the Roman numerals, cut in with a knife or sawn across the face of the tally, making

a notch on one corner, or any other mark you may devise, to stand for ten, and others for fifty and one hundred, if necessary. Stake labels are sometimes made of brick or potters' clay ;

they are simply tapering bricks of divers fashions and sizes, of which one end is formed as a tablet, upon which the name or number is imprinted while soft, or painted on, and afterward properly glazed and burned hard, Fig. 102 *c, d*.

TIES.

Strips of the ordinary Russian bass mat, common in our furniture stores, though generally called "garden" mats, or similar strips of the inner bark of our own bass-wood-tree, or of the willow, or the leather-wood, *Dirca*, or the paper mulberry, or of well-kept corn-husk, or coarse yarn, or cheap cotton twine, or candle-wick, or strips of rag, may all be used in various ways as ties, and some of them should be kept at hand for the purpose. But for securing trees when staked, straw bands are used.

CHAPTER XV.

Nature of Budding.—Bud Scions.—Stocks for, and Modes and Times of Budding.—After-treatment, &c.

BUDDING.

BUDDING is a process suited, with few exceptions, to all kinds of trees and shrubs, and should be generally preferred to grafting for its simplicity and ease.

The knives for this purpose, figured page 211, are the only forms really suitable for expert and rapid work, but the operation *may* be performed with a common pen or pocket knife.

Budding and grafting, though appearing somewhat difficult in description, which is necessarily prolix, are really very simple operations, which any whittling boy or smart girl may perform, and succeed on the very first trial; and, with the facilities for the cheap and rapid transmission of scions or grafts afforded by our present mail rates, the author has pleasure in anticipating that many young persons will avail themselves of the instructions here given, and plant and bud or graft choice fruits for coming years.

As a matter of curiosity, either grafting or budding may be

successfully, though with some difficulty, performed with the buds inverted, the wood cells consisting of even cylindrical tubes, through which the circulation will pass in either direction.

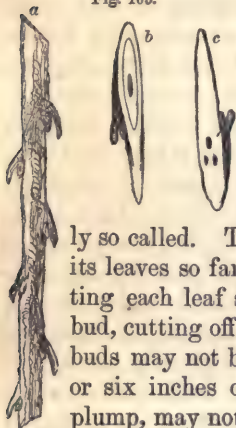
Budding is often called inoculating, but this name seems to have originated in a misconception. Inoculation is, in medical practice, the introduction of a virus into the circulation, which spreads through it. But budding and grafting are the simple planting of a bud or branch cutting in circumstances favorable to its rapid growth and development as a tree. Nothing from it, so far as we know, permeates the system and affects the character of the stock; nor does it receive any appreciable modification in its own essential characteristics from the stock; but uniting with it, or living as a parasite upon it, and deriving its nourishment through it, its own inherent force is put forth in the formation of its system of stem, branches, and fruit, the stock also retaining for itself the same distinct individuality, each preserving in undiminished force its peculiar local powers of appropriate secretion and organization, all growth from below the junction being constantly throughout the life of the tree "natural," or of the stock, and all above the junction partaking with equal constancy of the nature of the graft. There is, therefore, no analogy between inoculation and budding, and we retain the latter term. Contrary to the above views, it has been supposed by some that late fruits are materially affected in their period of maturing by being budded or grafted on stocks of early kinds; but if this were so, of which I have failed to find proof, the converse ought also to be true, and our early fruits become belated by grafting upon stocks of later varieties; but almost all apple stocks are raised from kinds comparatively late. Upon these our earliest apple—the little white Early May—has been continuously worked for centuries, and upon this theory it is inconceivable that it should have retained its distinctive character.

It may, perhaps, be regarded as certain that, in general, the stock affects the graft only in two ways: first, by its own hardness and durability, securing, under proper conditions, continuance to the graft inserted in it; and, second, by the character

of its growth. If this equal or exceed the graft in freedom, healthful vigor of growth in the tree is secured ; if it fall much short of the freedom of the graft growth, diseased or morbid action is superinduced, and hence the dwarfing, premature fruiting, and limitation of life.

BUD SCION AND BUDS.

Fig. 103.



- a. Bud scion trimmed for use, and inverted as it must be held in cutting out the buds.
- b. The bud as cut from the inverted scion, with the wood in.
- c. The bud turned to its natural direction, with the wood taken out.

The young shoot from which buds and grafts are cut is called a scion, and sometimes the graft itself is improperly so called. The bud scion is prepared by trimming off its leaves so far as the buds are full and ripe for use, cutting each leaf stem a quarter or half an inch from the bud, cutting off the butt end of the scion upon which the buds may not be plump, and rejecting at discretion four or six inches of its point, on which the buds, though plump, may not be ripened.

The necessary bandages, which may be prepared from any of the materials named for ties, page 218, should be cut into lengths of from twelve to eighteen inches, and strung to a girdle or through a button-hole, so as to be conveniently out of the way until wanted.

Taking the prepared scion in your left hand, *with its point toward you* (Fig. 103 a), hold it firmly between your thumb and the second joint of the middle finger, while the point of your extended fore-finger supports and steadies it precisely underneath the bud which you intend to remove.

With your budding-knife, perfectly keen; in your right hand, held firmly by the fingers as when sharpening a lead-pencil, with the right thumb laid, not under, but upon the scion, immediately against the point of the left thumb, stretch the hand until the knife rests flatly upon the scion, half an inch or a little more back of the bud ; then entering the edge, carefully and

gradually, with a drawing and perfectly level cut, let it pass under the bud at a depth just sufficient to cut out the bud with its swelling, scarcely scaling the wood, and coming out gradually as it entered, half an inch or more above the point of the bud (Fig. 103 b).

Sometimes the thin scale of wood is taken out from the bud, and the bark only inserted (Fig. 103 c), but this is entirely unnecessary, involving also some difficulty, and risk of spoiling the bud. If done at all, it should be performed by turning the bud into its natural direction, and holding it carefully between the points of the thumb and fore-finger of the left hand, and, loosening the wood from the bark at the upper end with the point of your knife, pass the blade under it, and holding the thin piece of wood firmly by pressing your thumb upon it on the knife, lift it carefully from its place with a slightly turning or rolling motion from one side, and you will probably effect its removal without drawing out the germ of the future tree,

which is the danger to be apprehended, and which will almost certainly occur if you begin the removal of the wood at the wrong end.

Fig. 104.



STOCKS SUITABLE FOR BUDDING.

Stocks for budding should not, at the largest, be more than three fourths of an inch diameter, nor smaller than, at the least, twice the thickness of the scion from which the bud is taken. A stock is prepared for budding by trimming off all leaves and branches from near the point at which the bud is to be inserted, and generally all below this point, though this last is not essential unless the lower growth be strong, Fig. 104.

STOCKS PREPARED AND BUDDED.

Having cut out the bud as above directed, hold it for a moment edgewise between your lips, and with your knife, held lightly by your thumb and finger points, make a cross cut just in the clear spot chosen for inserting the bud, through the

Fig. 105.



- a. The stock prepared for receiving the bud.
 b. The stock, with the bud inserted and shortened.
 c. The stock, with the bud inserted and bound.

bark, about half an inch or less long ; then, turning your knife point downward, with your right fore-finger pressing upon the back of the blade, the handle being held firmly between the thumb and middle finger, make a straight, clean slit from an inch below upward to the cross cut, forming a T. When at the cross cut, and before withdrawing the knife, rack it once from side to side, so as with the edge to loosen and slightly open the bark at that point (Fig. 105 a) ; quickly turning the knife handle down, and holding it as a pen is held in writing, pass the square corner of the bone handle carefully under each edge of the slit, opening it just enough to admit the bud, and no more ; then, having inserted this, slip it down toward the bottom of the slit so far as to make it sit firmly in its place, using for this purpose either the finger laid upon the piece of leaf-stem and the bud, or the dull notch intended for that purpose at the opposite corner of the handle (see p. 211). If the upper end of the bark of the bud extend at all above the cross cut, take it off by passing the knife once more along the cross line, so that it will set in nicely (Fig. 105 b). Then tie it carefully and tightly, beginning at the bottom, and taking special care

that in starting to wrap it you do not also press the bud upward out of place, and as you proceed in the binding, use a gentle pressure upon it to make it fit its place, leaving only the short leaf-stem and point of the bud uncovered by the bandage (Fig. 105 *c*). Or two bands may be used, beginning with one immediately above the bud, and wrapping upward, and the other just below and on the swell of the bud, and winding downward, the latter only being loosened or removed at the first after-dressing of the bud. This, however, like too early budding, is apt to start the young bud in the fall, which, when occurring from any cause, is injurious, increasing the labor of tending, generally resulting in the production of a feebler growth than if the bud had lain dormant until spring, and almost uniformly rendering the tree more or less unsightly at the point of junction of the bud and stock.

ANNULAR BUDDING.



ANNULAR BUDDING is performed by cutting, or rather peeling, a ring of bark about half an inch wide from the stock (Fig. 106 *a*), and a corresponding ring, containing a bud, from a scion of equal size, or a little larger (Fig. 106 *b*), and fitting the latter neatly in the place of the former, shortening it if its girth be greater than necessary, and binding it carefully and firmly. This mode of budding is peculiarly suited to trees having thick, rigid bark, and is

rarely used.

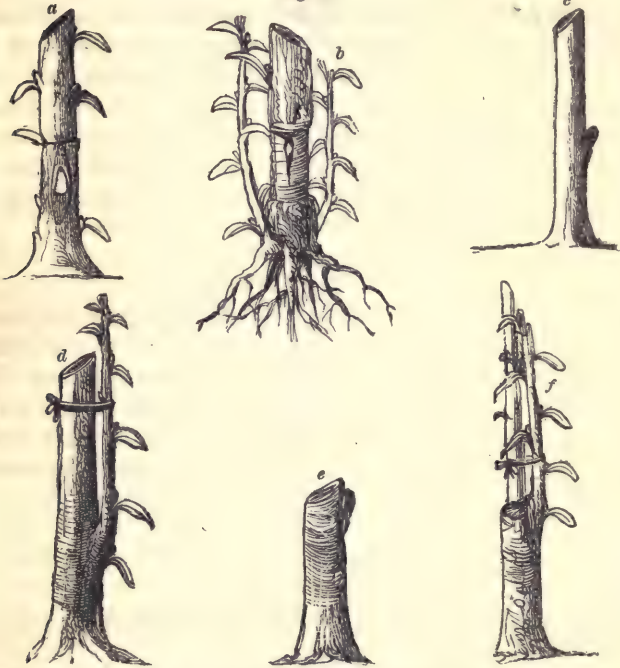
TIME OF BUDDING.

All budding may be performed in the fall. Fruit-trees and some fancy forest trees are usually budded in July and August, beginning with pear and cherry, then plum, orange, rose, apple, and peach, the latter being sometimes postponed to September. The time, however, will vary with locality, it being always advisable to bud as late as may be possible consistent with the easy and successful setting of the bud, so that

no growth may take place before spring. Orange-trees and other green-house plants, being calculated to grow right on under protection, are exceptions, and may be budded in spring, or summer, or winter.

AFTER-TREATMENT.

Fig. 107.



- a.* The bud united to the stock, and the bandage loosened and removed in due time.
- b.* A neglected bud, the bandage having cut deeply into the stock, causing unnatural enlargement above and below, with a growth of stem-suckers.
- c.* The bud in spring, the stock cut down about four inches above it, and all the natural or stock buds removed.
- d.* The bud growing, and tied up to the shank of the stock.
- e.* The bud in spring, the stock being cut at once down to the point of the bud.
- f.* The bud growing naturally upright, but staked to secure it against danger of injury in its early stages.

In about two weeks after the budding you may loosen the bandage, and before winter, or whenever it seems to be cutting

into the stock, remove it entirely, when the bud will be found firmly united to the stock, but showing no signs of immediate growth, Fig. 107 *a*. If, however, the bandage be left without relief, it will cut into the stock, sometimes destroying the bud, and forcing a fall growth of stem-suckers, and the multiplication of sucker-buds at the collar of the stock, Fig. 107 *b*.

Early in the spring remove all natural or stock-buds, and cut off the head of the stock about four inches above the bud, Fig. 107 *c*. When the latter has started to grow four or six inches, draw it gently upright, nearly touching this shank, and tie it carefully, Fig. 107 *d*.

Keep the stock free from all young natural shoots throughout the summer, and if the bud grows at all thriftily, cut off the shank with a sharp knife about the end of June, finishing it with a downward slope from the back of the bud.

As there is some difficulty in cutting away the shank at this time without injury to the young growth of the bud, it may be avoided by cutting the head of the stock at once down to the bud before it starts to grow, as in Fig. 107 *e*, and the young shoot from the bud will naturally grow upright, Fig. 107 *f*. As a measure of defense against possible injury, the top of the stock which is cut off may be stuck firmly down by the side of the bud, which, while young, may be tied up to it as a stake, Fig. 107 *f*.

CHAPTER XVI.

Grafting.—Grafting large Trees, &c.—Various Modes and Times of Grafting.—After-treatment.

GRAFTING.

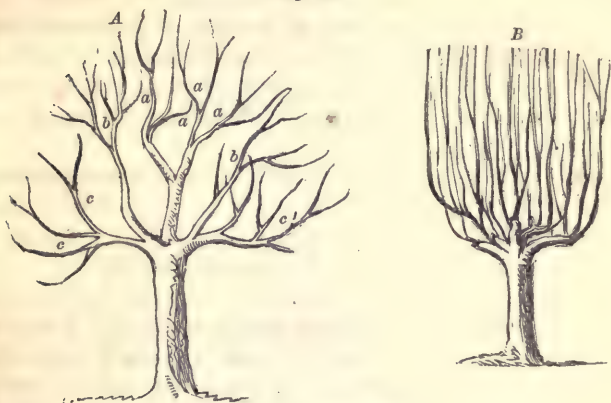
For figures and descriptions of grafting and budding knives, see pages 211–213; and for ties, page 218.

Around every country home, however humble, there should always be found some natural stocks of various kinds, such as have been described pages 204 and 205, ready for budding or grafting whenever scions of valuable fruit may be obtained. If they are not used for the propagation of new varieties, they

will serve for valuable common kinds, care being taken to graft them before they become very large, although even then they may be grafted as shown below.

LARGE TREES.

Fig. 108.



A. Large tree to be grafted by installments, viz :

a, a, a. To be grafted the first year.

b, b. To be grafted the second year.

c, c, c. To be grafted the third year ; and any that have failed to grow may also be re-grafted.

B. A large tree, the limbs of which have been cut off to induce a growth of sprouts for budding or grafting.

Whenever it is discovered that fruit-trees are not such kinds as we would desire, or are of such kinds as do not suit our particular locality, they should be immediately re-grafted, substituting a variety of known character and success. Little or no time will be lost in the maturing of the tree for full bearing if this be done with promptitude. If, however, the tree has attained considerable size, let it be grafted by installments, beginning near the top, and grafting about one third of it per year. See Fig. 108 *A*.

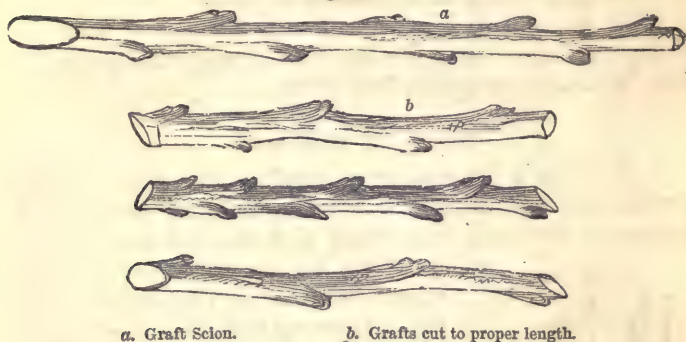
Sometimes such a tree has all its limbs cut off at once within a foot or two of the trunk, for the purpose of inducing a young growth of sprouts that may be more easily grafted or budded ; and if the tree be comparatively young and vigorous, it may

bear this treatment and make a full head of young sprouts, as Fig. 108 *B*. But there is much risk of killing the tree if it be old or feeble ; the ends of the limbs seldom heal so well as if they had been crown grafted (see page 233), and even after buds or grafts have taken in such a tree, if at all neglected, they are apt to be overgrown and destroyed by the sprouts.

But in all large tree grafting it is highly important to give careful after-treatment, as directed page 240.

PREPARATION OF GRAFTS.

Fig. 109.



Scions for making grafts are taken from the young shoots of the previous year's growth, rejecting the older wood, as well as any blossom-buds that may have formed upon the younger ; these are known by their round fullness, and are sometimes chosen to gratify a fancy for producing a fruit from the graft or bud the first year ; but the growth is always injured, and the tree sometimes lost by the operation, which thus becomes too expensive. They should be taken from the tree before the approach of spring, and either buried in sand or earth, or placed butts downward in a small pit or grave on the north side of a fence or building, and having sufficient straw packed over them and alongside them to keep them from drying out or becoming dirty, except the butts, which, resting upon the bottom, will obtain enough moisture to keep them fresh. When taken out for use, let them be washed clean and cut up into

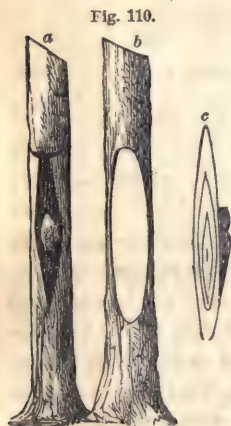
grafts of four or six buds each in length. These are usually carried in a pouch, or bag, or apron tucked up by the corners, worn for this purpose while grafting, which, when two knives are used, serves also to carry the one while the other is in the hand.

Scions, or grafts in their proper lengths, as above, may be cut at any time from late fall through winter, and kept for weeks, or even months, simply wrapped in paper; or if sealed at the ends with shellac or collodion, and the wrapper also made air-tight, so much the better, particularly if it is intended to transport them through warm latitudes.

They may also be sent by mail with the greatest ease, and if used as single-bud grafts (see next figure), each graft will furnish at least enough for four stocks.

MODES OF GRAFTING.

As budding is the planting of a bud cutting, so, in general, grafting is the planting of a branch cutting, the most marked distinction between them being that the bud scion is the growth of the current season, the graft scion of the season previous, and single-bud grafting links the two processes.



a. The stock headed down, with the graft bud inserted.

b. The stock headed down and prepared for the bud as a patch, or tongued.

c. The bud-graft.

SINGLE-BUD GRAFTING.

SINGLE-BUD GRAFTING may be practiced with entire success by inserting buds from carefully-preserved graft scions, in the manner directed for budding, page 222, as early in the spring as the bark of the stock is found to run, in which case, however, the stock is cut down at once in one or other of the modes directed for budded stocks, page 224, figures 107 c, e, and all natural growth kept off, so as to force an immediate growth from the bud-graft. It may also be performed before the bark runs by heading down the stock as for

cleft grafting, and cutting a small slice from the side an inch or so below the top (Fig. 110 *b*), and setting the bud on as a patch, fitting it with exactness, and binding it with care; or, the bud being cut out thick for the purpose, a small tongue may be made in each, so that they may be more conveniently bound together. In either mode, the after-treatment is precisely that directed for growing buds, page 225.

SIDE GRAFTING.

In SIDE GRAFTING a slit is made as for budding, and the graft, being cut from one side only into the form of a tapering, half-round wedge, is inserted and bound; or it is bound on to a spot in the stock from which a slice of bark of corresponding size has been cut, merely fitting it on, as in single-bud patch grafting, or tongueing it, as in tongue grafting, but shorter, deferring the heading down or shortening of the stock until the graft knits, as in inarching.

Side grafting is used chiefly for ornamental forest trees, upon which it is supposed to succeed better than other modes; but it may be applied to all kinds of trees, and will sometimes be found especially useful for balancing or giving symmetry to a one-sided tree, replacing a lost branch, etc.

Fig. 111.

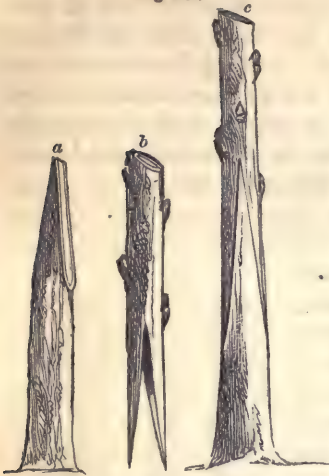


- a. The stock prepared, with a T, as in budding, to receive the graft.
- b. The graft, a tapering, half-round wedge, ready for insertion.
- c. The graft inserted, and ready to be bound and covered.

SADDLE GRAFTING.

In SADDLE GRAFTING the stock is cut wedge form (Fig. 112 *a*), and the graft, being first split up the necessary distance, is pared on the inside so as to form a cleft, of which each prong or lip is a tapered half-round (Fig. 112 *b*); these are neatly set across the stock at one side (Fig. 112 *c*), so that the inner barks of graft and stock fit together to the very end of the lips, and the whole is then carefully bound, as directed

Fig. 112.



- a. The stock prepared.
 b. The graft prepared.
 c. The graft fitted upon the stock and ready for binding.

for buds, page 223. If convenient, it is much better to have the graft and stock of precisely equal diameter; but, except for a fancy, it is hardly worth while to use this mode of grafting at all.

There are innumerable other fancy modes, for which the French and Chinese are famous, but which will readily suggest themselves to any one for pleasant amusement.

The common and useful modes of grafting are three. Cleft grafting, which is performed upon stocks as small as three fourths of an inch in diameter, or limbs as large as a man's arm; crown grafting, used only for large trees; and tongue grafting, which is chiefly adapted to very small stocks.

CLEFT GRAFTING.

Fig. 113.



- a.* The stock cleft, and ready for the graft.
- b.* The graft wedge prepared for insertion.
- c.* The graft set, and ready for binding and covering.
- d.* The graft set, and covered with rag and composition.
- e.* The graft set, and covered with grafting mortar.

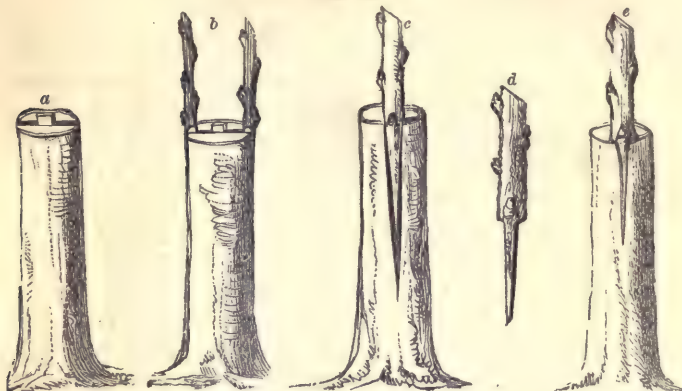
In cleft grafting on stocks of small or medium size, the depth of the split will unavoidably vary, as they may prove of different strength and flexibility, some opening almost as freely as leather, and others stiffly and with difficulty, the split extending far down the stock; in large trees or limbs this last is still more troublesome.

To effect grafting by this mode rightly, let your stock be cut down to the desired point, in general as near the ground as convenient, with a slight slope backward from the side on which you intend to set the graft, where a portion about the width of the graft is cut level (Fig. 113 *a, b*). Split the stock by placing your knife across the centre of this level spot, not perfectly square, but with the point bearing downward, so that as you press it the bark will be first cut a little ahead of the splitting, making also the split upon the outer side a little deeper than on the inner.

Take your graft, a piece not more than five inches long, and holding it in your left hand as you would hold a pencil to sharpen it, with your knife firmly grasped, place the butt between the blade and your right thumb, and with a steady drawing motion cut the one side of a wedge from an inch to two inches long; then, turning the graft, cut the other side in the same manner, being careful that the cut is perfectly free from raggedness or twist, that the inner edge is a little thinner than the outer, and that the length of your wedge is proportioned to the depth, to which, when inserted, it will open the cleft, so that they will as nearly as possible fit throughout (Fig. 113 *b*). Having your stock and graft ready, put the point of your splitting knife into the crown of the cleft just at the pith, and strain it gently open while you adjust the outer edge of the graft-wedge to the bark of the stock, allowing the cleft to close upon it when in position. It is then ready for wrapping, Fig. 113 *c*.

CLEFT GRAFTING LARGE LIMBS OR TREES.

Fig. 114.



- a. Large stock cleft and wedged for the reception of the grafts.
- b. Large stock cleft grafted.
- c. Large stock cleft grafted, showing the excessive opening of the split, and the difficulty of fitting the graft wedge to the stock.
- d. Shouldered graft, with thin, tongue-like wedge, to obviate the difficulty of fitting the graft wedge to the stock.
- e. Thin-wedged, shouldered graft inserted, with bud resting on both sides of the cleft.

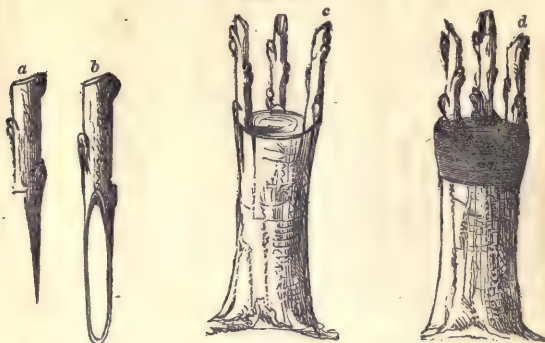
In cleft grafting large trees or branches, the body or limb is carefully sawed off and smoothed. It is then split with the curved knife of the grafting tool, which should be driven with repeated gentle blows with a light mallet rather than with a sudden stroke; the wedge end of the tool is then inserted at the centre to keep the cleft open, or a wooden wedge is used (Fig. 114 *a*), while a graft is set on each side, the graft wedge being cut as above directed, except that it may be of even thickness on both edges, the cleft in this case being equally open on both sides (Fig. 114 *b*).

Owing to the difficulty experienced in cleft grafting large trees on account of the depth to which the cleft in a strong body or limb will open (Fig. 114 *c*), the grafts for this purpose are sometimes *shouldered*—that is, cut square in on both sides at the upper end of the wedge, and, instead of a true wedge, a thin, wedge-like tongue is formed for insertion in the cleft (Fig. 114 *d*), while the shouldering is carefully made just

below a bud, so that its swell may rest upon the bark of the stock on both sides of the cleft, as shown Fig. 114 *e*.

CROWN GRAFTING.

Fig. 115.



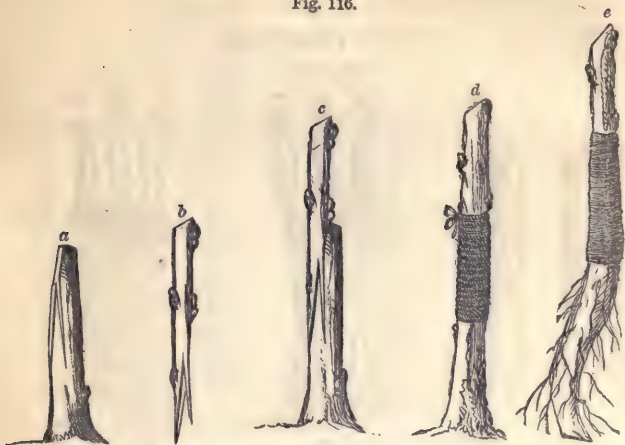
- a*. Shouldered graft for crown grafting.
- b*. A simple tapering half-round graft for crown grafting.
- c*. A large tree crown grafted and ready for covering.
- d*. A large tree or limb crown grafted and covered with rag and composition.

CROWN GRAFTING is altogether the simplest, easiest, and most desirable mode for grafting very large limbs or trees. In this process the head or limb is sawed off and smoothed as for cleft grafting, but, instead of splitting the stock, the grafting stiletto (Fig. 98, page 213) is carefully passed to the depth of one or two inches between the bark and wood, loosening the former, and slightly cracking it open, when the graft, which is cut only on one side as a tapering half-round wedge, of any desired length, and with or without a shoulder (Fig. 115 *a*, *b*), is firmly set in.

Two, three, or even four such grafts may be set in a large limb (Fig. 115 *c*, *d*), their number, if they all live, hastening the covering of the stump of the limb, and when this is effected they can be cut away. If it happen that they grow so much the first season as to be in danger from winds, let them be slightly shortened in August, or braced; but this will not often be necessary.

TONGUE GRAFTING.

Fig. 116.



- a.* The stock prepared for tongue grafting.
- b.* The graft prepared for tongue grafting.
- c.* The graft set, or graft and stock interlocked.
- d.* The graft set and bound, ready for covering with grafting mortar or composition.
- e.* A length of a one-year-old seedling root tongue grafted and wrapped with tow, and ready for planting.

TONGUE GRAFTING is not so simple as cleft or crown grafting, neither is it any more successful, but it is much better suited to very young stocks, from a quarter to three quarters of an inch diameter, and is sometimes preferred on account of the greater delicacy of handling which it requires, and the promptitude and neatness with which it usually heals over.

It is performed in the following manner: the stock being cut off to a clear spot with a sloping cut, a slice or tongue of wood is cut from one side, one or two inches long, to the depth of from one to two thirds the diameter of the stock to be grafted, leaving it, except in the greater length of the cut, much like the mouth-piece of a hunter's whistle. The knife is then turned edge downward, and being gradually entered upon the face of this cut, about one third down, a thin tongue or apron, of less than an inch in length, is carefully formed, Fig. 116 *a*. The graft is then cut of a length to match with the

cut upon the stock, in the manner directed for crown grafting, leaving it a clean, regularly tapering half-round wedge, without a shoulder. Being then turned in the hand, and held precisely as directed for the bud-scion, page 222, and with just such a careful movement as in cutting out the bud, it is tongued thinly, to correspond with the stock, Fig. 116 *b*. The two tongues or aprons are then interlocked, care being taken to fit the bark of the graft and stock accurately together, Fig. 116 *c*. It must then be bound with more than usual care, with bass strips, or yarn, or rag, Fig. 116 *d*, and covered with grafting composition or mortar, as Fig. 113 *d*, *e*, p. 230.

Tongue grafting is considerably practiced by nursery-men, who make three or four stocks of one seedling plant, cutting its tap-root into lengths, washing and grafting them during winter, and binding them with tow, Fig. 116 *e*. They are then placed in boxes with sand until spring, when they are set out with a dibber, in the manner prescribed for setting out cabbage-plants, leaving one bud only above ground.

INARCHING.

Fig. 117.



a, *b*. Companion trees tongued.

c. Stock in pot upon a stand inarched with a branch, with stay-bar.

d. Companion trees inarched and bound, with strain-bar

Grafting by approach, or inarching, is a peculiar mode, in which we take a whole branch or small head instead of a sin-

gle bud or a small portion of a shoot, and unite it to the stock, with or without heading down the stock, and before separating the branch-graft from the parent tree.

This mode of grafting is used chiefly for woody flowering or fruit-bearing green-house plants, as camelias, oranges, &c., which, being in pots or boxes, can be readily adjusted for the process, but may be used for all kinds of trees.

It is performed by bringing together the stems of companion trees, using a strain bar, if necessary, to control their position, or arranging in contact the stem of the stock and the selected branch-graft just at the point chosen, and uniting them by tongue grafting, forming by their union an arch (en-arching them), of which the graft tongues form the centre or key. See Fig. 117, *c* and *d*. The process is not very difficult. Choose your stock, and the branch or head you propose to transfer to it of equal or nearly equal size, which may be from a quarter to rather more than half an inch diameter. Trim them, or either of them, as you may find needful, to permit their easy approach; then cut from each, precisely at their point of contact, a section or slice of equal length and size—say about two inches long—reaching in depth to about one third their diameter, the knife entering and coming out gradually in the very same manner as in cutting a bud from the scion. See p. 220. If either is larger than the other, the depth of cut must be proportionably shallower, so that the barks on both their sides may match with exactness. A rather stout tongue is then cut upon each, passing the knife upward from about a quarter or half an inch *below* the centre of the cut upon the graft-branch, and downward from about a quarter or half an inch *above* the centre of that upon the stock, making the tongue upon each equal, and of sufficient length to permit the whole to match. See Fig. 117 *a*. These must then be carefully and rather firmly interlocked, care being taken to match the barks together with precision *throughout*, lengthening the cut a little upon either by entering the knife cautiously between them if they do not correspond at the ends. Bind them very strongly with bass strips or other ordinary bandages, and cover thickly with grafting mortar or composition.

When inarching is to be performed upon plants in pots or boxes, arrange a firm stand for the plant that may be short, so as readily to bring together the parts to be operated on, making, however, a little allowance for raising or lowering the one or the other when you come to interlock them. If there is any danger of disturbance, a stay, consisting of a piece of pine board four to six inches wide, may be lashed to the stock and parent tree, extending from near the root of the shorter (see Fig. 117 c); and if the graft-branch does not easily come into position to form a handsome head, it may be strained or drawn a little into order by being bound to a stake set for the purpose, or by a fastened cord stretched to some firm hold.

If well done, they will unite by what surgeons call "first intention," and in a few weeks, or sometimes months, more or less, the branch-graft may be severed from the parent tree, and the head of the stock be cut off, each close to the point of union, leaving upon the new tree the appearance of a simple and not very neat splice, which, however, the subsequent growth of the plant will rectify.

The possibility of making this mode of grafting available in fancy and ornamental arrangements will at once occur to the intelligent reader. It is not absolutely necessary to tongue the parts if they are well matched and bound, nor to separate the graft and stock, or to cut off either of them; but in ordinary cases this is done after they have knitted perfectly, the severance being effected gradually, cutting each about one third through at a time, at intervals of ten or twelve days or more.

TIME OF GRAFTING.

Grafting may be performed at any time during the winter upon young stalks cellared for the purpose, and kept in sand or common earth until the opening of spring permits their setting out.

The proper time of grafting on ordinary stocks in the open ground is just as soon as the circulation begins in the spring, and before the growth actually commences. This differs in different trees and latitudes. The following will be found a good general order of grafting, viz.: Cherries, plums, pears,

apples ; but if scions are cut early and well preserved, grafting may be successfully performed by a skillful hand until the trees become full-leaved, though earlier grafting is to be preferred. Crown grafting upon large limbs should be deferred until the trees are just ready to push their buds, so that the stiletto will readily open the bark for the reception of the graft-wedge.

Inarching may be performed, like other grafting, just before growth commences. In plants that are housed, as camellias, &c., this may be after New Year, and again in June, but in out-door kinds at ordinary spring-time.

BINDING UP AND COVERING.

When grafting is performed upon stocks before planting them, they are sometimes not bound up at all ; at other times, and especially when they are small seedling stocks, they are wrapped with refuse tow, or flax, or rag, or other bandage (see Fig. 116 e, p. 234), and in both cases, being planted sufficiently deep, in rows, the earth is ridged slightly along, so as to shed the rain and substitute for other protection. When grafted above ground by either of the modes described, except cleft and crown grafting, careful bandaging is never omitted ; but, either with bass strips, or rags, or tow, they are bound firmly to their true position, and covered either with grafting mortar or composition, as directed hereafter. In cleft and crown grafting, the graft is generally held with sufficient firmness to its position by the stock, and requires only covering from the air and moisture, which is effected either by coating it with composition (No. 1), or binding it with rags coated with or soaked in the composition ; or binding or wrapping it first with rag or other material, and applying with a brush one or other of the compositions described on another page ; or by forming around it a ball of grafting mortar as large as a goose egg. This must be so applied as not to press the graft out of place, and, being moulded to an oval or egg form four or five inches long, with the upper and smaller end carefully closed, and the larger end well set around the stock just below the wrapping, it is nicely finished by dipping the hands in a little dry dust or ashes, and

giving it the proper shape (Fig. 113 *e*, p. 230). Care is required in the binding to avoid drawing the bandage into a string around the neck of the graft; otherwise, when it swells, the bandage will cut in, and soon the wind will snap it off. At this point let the wrapping be free as possible, and in putting on either the composition or mortar, be sure that no small hole or fissure is left for water to settle into the cleft or other opening in which the graft is inserted.

GRAFTING COMPOSITION.

No. 1.

Equal parts of rosin, beeswax, and tallow, melted together and worked into toughness by kneading and pulling, as molasses, when boiled down, is made into taffy. It may be kept in water, and used without bandages. Being warmed in the hand for use, it is made into small, thin sheets as wanted, and pressed closely over the wounds and around the grafts, so as to exclude air and water, a little grease being used to prevent its sticking to the fingers.

No. 2.

Two parts rosin, one or one and a half part beeswax, and half or three fourths of a part tallow, melted together as No. 1, and spread with a brush while warm on rag or cheap muslin, which may be cut or torn into strips or patches as wanted for use; or the strips or patches may be soaked in the composition. Or the graft may be bound with dry rag, the loose end being sealed down with a touch of the composition, and the whole covered with a coat laid on warm with a brush, the composition being kept melted over a furnace or pot of embers.

No. 3.

Two parts pitch, two parts rosin, one part beeswax, one part tallow, and one part turpentine, melted together and boiled for half an hour. This is, on the whole, superior to the former, and may be used as that, either spread on the rag before wrapping, or laid on with a brush after the graft has been bound, being kept melted for this purpose.

GRAFTING MORTAR.

What is called grafting mortar is made either by mixing strong loam or clay with an indefinite proportion of horse-dung or cut straw, or both, working it up to the consistence of mortar thoroughly and repeatedly to toughen it. When required for use, it should be a little stiffer than potter's clay.

Instead of the above, equal parts of strong loam and cow-dung may be used, to be prepared and applied in the same manner.

AFTER-TREATMENT.

Newly-set grafts should be watched throughout the season, to stop and restop any holes or cracks which the heat of summer or the swelling growth may occasion in the coating which defends them, and to slacken the bandages by cutting them through at the back of the stock whenever there is danger of their cutting into the stock or graft. The growth of the graft should also be observed, and a proper form and direction given to it by nipping or tying up, as may be found necessary.

In addition to these precautions, young stocks budded or grafted should be kept carefully clear of natural or stock shoots, all of which must be removed as soon as they appear. The hand, defended by a stout glove, may be rubbed harshly around or down the stock while they are yet quite tender, and it is done.

But larger and older trees require different treatment. Only a part of the limbs of a large tree should be grafted at one time, so that there may be a sufficient supply of leaves produced to effect a healthful circulation in the tree; and, for the same reason, much of the young growth may be suffered to remain upon the limbs that are grafted, to keep those parts in vigor. If these precautions are neglected, the full grafting of a large tree will generally kill it, or portions of it. But, on the other hand, the moment it is seen that the grafts have taken, care must be given that no strong, gluttonous shoots are put forth near them, but all such as seem likely to become stronger than the graft growth should be nipped from time to time, to check them and strengthen it.

In succeeding years, the remaining limbs may be grafted,

and the needless branches and sprouts cut away in the course of winter pruning, having regard always to the necessities of the system of circulation in the individual tree. See page 226.

HEIGHT OF STEM.

Fig. 118.



- a. Orchard tree, with stem seven to nine feet high.
- b. Orchard tree, with stem four to five feet high.
- c. A dwarf tree, trimmed into conical form.
- d. A dwarf tree, conical, but formed with drooping habit.

In rearing the young tree from the bud or graft, we usually determine the height of its stem when ready for bearing. It

is therefore plain that we may take our choice of low or high trees, tall or short stems. The general practice has been to set out trees with tall stems, or trim them up tall afterward, Fig. 118 *a*. This perhaps may have arisen from the too prevalent habit of suffering cattle to run in our young orchards, which is as outrageous as it would be to stable them in our parlors. It is difficult to change habits, even after the reason for their formation has passed away; but it is clear that orchard trees with short stems, say four or five feet high, are, on many accounts, more desirable than tall ones. (See Fig. 118 *b*.) They are much more readily pruned, the fruit is more easily gathered, and thus much labor saved. A certain farmer, scarcely yet in middle life, has an orchard of sixty russetting apples, grafted and planted by himself when a boy, which yielded in 1856 some six hundred barrels of fruit, half of which could be gathered without bench or ladder by a man of ordinary height standing upon the ground.

Fruit is not so readily blown off from low trees as high ones, and when it falls is less injured for use or market. The main stem of a short tree is also less exposed to injury from the sun and from late spring frost, the latter sometimes bursting the vessels in which the heat of the former has caused the circulation to start.

Insects do not so readily select a tree partially shaded as a place of deposit for their eggs, instinct telling them that they need the sun to hatch them.

Shorter stems for orchard trees, and higher fences for orchards, will be found decided improvements.

Very low-stemmed trees, or "dwarfs," are sometimes pruned into a pyramidal, or, rather, conical shape, by suffering all the young side shoots to grow, and nipping their extremities, shortening also the main shoot or leader, Fig. 118 *c*; or, with the same general form, a drooping habit is given to the young tree by tying downward the points of the young branches, Fig. 118 *d*; and these and other fancies may be pursued to any extent.

CHAPTER XVII.

Setting out Trees, preparing Holes, &c.—Tables of Arrangement of Distances, Area, &c.—After-culture.—Combination of Fruits.

SETTING OUT.

FOR all kinds of trees that are perfectly hardy, early fall planting is to be preferred. If the earth is sufficiently moist to allow of their being well taken up, they should be removed as soon as the circulation is checked, or say when the first frost causes a fall of the leaves. Trees that are liable to injury from the winter, as peach, and, in some places, cherry, should, in such localities, be set out only in the spring.

In choosing trees for setting out, those of moderate or even small size are generally to be preferred. Large trees suffer more by removal, and require more prompt and abundant supplies to start them again vigorously. They are also more difficult and expensive to transport; yet, if not removed far, and the directions for planting, given page 245, are observed, they may be very successfully transplanted, and, if well cared for by being staked and mulched, and, if need be, manured after setting out, will come quickly into bearing.

In general, however, fruit-trees should be set out where they are expected to remain in the second or third year from the graft or bud, except peach-trees, which, being commonly budded in the fall of their first year's growth from the seed, may be advantageously set out in the spring of their second year, before the bud sprouts, and, being properly headed down, the bud will make a strong growth before fall, and be benefited by remaining undisturbed from the start. If preferred, however, the common mode may be followed, which is to allow the bud to make a year's growth before the setting out.

The resetting of trees in their previous relative positions as to their north and south sides was formerly deemed of importance, but is of no practical consequence.

In general, the depth at which they are set should be about

that at which they have previously stood, or a little deeper, particularly if set out in the fall.

For special objects, or upon small lots, dwarfed fruit-trees may be found desirable, but they are not to be relied on as permanent, nor even of long continuance, without special care and high culture, and are not, therefore, recommended, except for intermediate planting, or for fancy, or in soils or climates unfavorable to the production of fruit upon more vigorous stocks.

If dwarfed trees are worked low, near the collar of the stock, and in the final transplanting are set pretty deep, so that the joint is covered five or six inches, roots will in due time be thrown out from the graft, and these, being stronger and more natural than the roots of the dwarfing stock, which may even perish after the new roots are formed, the tree will thence acquire additional strength, approximating in effect to a tree raised from a cutting, and having a character intermediate between an ordinary dwarfed tree and one grafted upon a seedling stock. It will be longer lived than the former, but not equal to the latter in the vigor of its roots, yet by careful summer pruning, as directed page 254, it may, for certain kinds or in particular localities, be preferred, and become a substitute for both, but, like the ordinary dwarfed tree, will always demand extra care.

SHORTENING THE ROOTS AND TOP.

Fig. 119.



a. Young tree pruned ready for setting out.

b. Young tree pruned, and set out upon a wet-soil surface, the roots being covered by hilling up, staked, and mulched.



If trees could ordinarily be removed with their roots from stem to extremity uninjured, the top also might be safely left entire, and the operation would be equivalent to no removal, so far as the growth of the tree is concerned. But the roots of trees usually extend as far, and often farther, than their tops, so that in practice this is entirely out of the question; it is only in the removal of trees in winter, with heavy balls of earth, that we even partially attain this object. In all ordinary cases of removal, excepting those trees which may have uncommonly short, fibrous roots, the larger portion of the spongioles, which form the utmost extremities of all the roots, are separated from the tree, and still others of them are often bruised or dried before the replanting of the tree. In this state of the case, since we can not preserve, we seek a process that will quickly reproduce them; that process is judicious shortening of both roots and top (Fig. 119 *a*). In this, as in ordinary pruning, there is doubtless somewhere a precise line of right, an exact limit; but as we have no immediate and palpable means of discovering this, we endeavor to approach it by proportioning, according to our best judgment, the one to the other. If, in ordinary cases, one third of the root is sacrificed in the taking up and shortening, we shorten or lessen the weight of the top to about the same extent.

In general, all the roots and all the branches should be operated upon, and in shortening the former the cut should be made with a keen knife on the under side, and sloping outward, so that, when planted, the face of the cut will rest upon the earth, affording a natural position for throwing out its young rootlets. The pruning of the top, also, should be done in a manner to balance the tree and secure an outward growth of the shoots, which will, in the main, be effected by cutting from within outward, just above a bud situated on the under or outside of the young shoot.

PREPARING HOLES AND PLANTING.

In setting out trees, make the holes at least twice the depth and width necessary to admit the roots of your tree. In digging them, keep the surface soil by itself; when the subsoil

is thrown out to a sufficient depth, the bottom of the hole should be loosened, and a portion of the surface soil or rich earth mixed with it, filling up the hole so far as may be necessary to suit the root. Having the root properly trimmed, set it carefully in position, with the fibres spread naturally, and fill in gradually with good earth finely pulverized, shaking the root gently once or twice to secure the filling up of any open spaces. When the roots are well covered with the earth, take the body of the tree in your hands, and, holding it true, press the earth with the foot upon the roots with moderate firmness; then fill up the hole about level with the surface, hilling a little if the planting is done in the fall, and dishing slightly if done in the spring.

If your soil be very wet, dig the holes as above directed, and refill them again to the surface, or very nearly, and, spreading the roots upon this loose surface, hill the earth over them, and carefully stake your tree. In wet soils of a deep boggy or mucky nature, and that can not be drained, holes need not be dug, but the tree may be set immediately upon the sod, and covered by hilling largely, staking it strongly, and mulching it. See Fig. 119 *b*, p. 244.

Whenever it is found necessary at the setting out to stake trees, it would be well to have the stakes set firmly into the holes and ranged with precision before removing the trees, in which case they may be easily and accurately arranged in position by being afterward set uniformly upon the same side of the stake; but, whether set before or after, let them be firmly bound to the stake with a straw or other coarse band, passing and crossed between the tree and the stake, so that, in case of frequent winds, it will prevent rubbing; and having spread around them, if it is spring, coarse litter, or straw, or loose rubbish of any kind, as mulching, weight it with a few stones to keep it in place, and your work is done (Fig. 119 *b*, p. 244).

If drought occur, you may, if you deem it necessary, apply water through the covering of mulch or litter; but avoid the not uncommon practice of pouring pails of water into the holes when planting, by which the earth, which should be loose and friable, is made into mud or mortar, which a succeeding heat

may bake to brick. Plant seasonably and carefully, and you will plant successfully.

ARRANGEMENT AND DISTANCES.

If found desirable, as it often will be, one or more of the plots of the garden may be appropriated to fruits, in which case, as in planting orchards, whether the various kinds of fruit are combined or not, the trees should not be arranged in exact squares, but in the alternated or diamond form—that is, so that each row will line either way, not with the row adjoining it, but with that which is next but one. The distance at which they are to be set should be carefully decided in view of the character and condition of the particular varieties you intend to plant, their modes of growth, and times of ripening their fruit, as well as the nature of the soil in which they are to stand, and the after-treatment they are to receive.

The following table will afford at a glance the data necessary to the arrangement of their relative distances, and show the area of surface allowed to each by such arrangement.

TABLE SHOWING THE DISTANCE EVERY WAY BETWEEN TREES PLANTED IN THE ALTERNATED OR DIAMOND FORM, AT VARIOUS WIDTHS, WITH THE AREA OR NUMBER OF SQUARE FEET OF SURFACE TO EACH TREE, AND THE NUMBER OF TREES UPON AN ACRE.

Widths apart.	Equidistant from each other.	Area or Number of Square Feet of Surface to each Tree.	Number of Trees per Acre.
40 feet by 34	40 feet.	1360 feet.	32
35 " 29	35 "	1015 "	43
30 " 25	30 "	750 "	58
25 " 21	25 "	525 "	83
20 " 17	20 "	340 "	128
15 " 9	15 "	135 "	322
10 " 8	10 "	80 "	544
8 " 7	8 "	56 "	778
6 " 5	6 "	30 "	1452
5 " 4	5 "	20 "	2178

If for any cause it is deemed preferable to plant in squares, the following table will be found useful, and its smaller figures may aid calculations of vegetable field-crops.

TABLE SHOWING THE NUMBER OF TREES OR PLANTS THAT MAY BE SET UPON AN ACRE AT THE GIVEN DISTANCES APART, OMITTING FRACTIONS.

Distance apart.	Number of Trees or Plants per Acre.	Distance apart.	Number of Trees or Plants per Acre.
40 feet by 40	27	10 feet by 7	622
35 " 35	35	10 " 6	726
30 " 30	48	10 " 5	871
25 " 25	69	5 " 5	1,742
20 " 20	108	5 " 4	2,178
20 " 15	145	5 " 3	2,904
20 " 10	217	5 " 2	4,356
20 " 5	435	5 " 1	8,712
15 " 15	193	4 " 4	2,722
15 " 10	290	3 " 3	4,840
15 " 5	580	3 " 2	7,260
10 " 10	435	2 " 2	10,890
10 " 9	484	2 " 1	21,780
10 " 8	544	1 " 1	43,560

AFTER-CULTURE.

Whenever young fruit-trees are set out, the land around them should be well cultivated, at least for several years. In arranging for this, hilled crops are to be preferred; and, whatever may be done with the intermediate spaces, let the lines of crop run so that each tree will occupy the position of a hill, receiving the same manuring and care through the season. If, from any necessity, the land is laid down to grass, or young trees are planted in sod, let a space be annually dug around each equal to the spread of the top, and a liberal supply of liquid or other manure be regularly given in the fall.

MANURING FRUIT-TREES.

In general, after they attain age and come into bearing, fruit-trees should be only moderately manured. A little salt may be spread widely around them in the spring, or air-slaked or old lime at the rate of ten to twenty bushels to the acre. Potash, in the form of spent ashes, which usually contain also sufficient lime, charcoal dust, coal ashes, chip manure, or the scrapings up of the wood-pile, crushed bones or bone-dust, decaying wood, or swamp-muck without composting. Liquid manure of any kind may also be cautiously applied. Animal matter, as horn shavings, wool waste, &c., &c., is valuable, but

care should be taken to apply it rather in deficiency than in excess, watching the effect upon the trees in your own particular locality and soil, and repeating or discontinuing its use accordingly, always aiming to induce moderate and regular growth, and steady rather than excessive bearing.

In orchard culture, where the plow can be freely used, it will be found a good practice to plow carefully once every third or fourth year, turning under, if convenient, a very light coat of barn-yard manure with the sod, and harrowing in thoroughly from fifteen to thirty bushels of lime per acre; seed immediately with clover, or clover and orchard grass; and top-dress annually with eighty or a hundred pounds of plaster to the acre, or alternate this with one hundred and fifty pounds of guano, or twenty bushels of ashes, and your orchard will thrive and your land improve.

COMBINATION OF FRUITS.

In the cultivation of various fruits, it is often agreeable, and may sometimes economize land and labor to combine them in the same orchard or plot. Thus, if apple-trees on common stocks are planted in alternated rows forty feet by thirty-four, they may be filled in with dwarf trees of any desired kinds by planting them in the line of the orchard trees at ten feet apart, with two full rows at the same distance between, in the thirty-four feet spaces, which will allow the rows to be made eleven and one third feet apart. The trees in a plot thus filled up will stand at right angles, eleven and one third by ten feet distance, each having one hundred and thirteen and a third square feet of space. See Plan No. 1, A, A, B, B, B.

The smaller trees are to be removed gradually as the advancing growth of the main orchard may require.

In planting pear-trees, twenty-five feet by twenty-one, or twenty by seventeen, a single row of dwarfed pears may be planted each way in like manner, standing twelve and a half feet by ten, or ten by eight and a half. Cherry, pear, or high-stemmed quince-trees may be set to advantage in the rows of raspberries, blackberries, gooseberries, or currants, also along the centre of strawberry-beds, and it will be found a good mode

of combination in either quince or pear plot to place the rows say twenty-two by twenty feet apart, or twenty-two by ten feet if preferred, each row standing in the centre of a strip four feet wide, for strawberries (Plan No. 2, A, C), while at seven feet distance from each row of trees a row of either of the smaller fruits above named is planted at from four to eight feet apart in the row, at discretion, leaving eight feet space in the centre, and affording ample room for their cultivation with the plow, or for planting small vegetable crops between them, if desired. See Plan No. 2, B, B, p. 251.

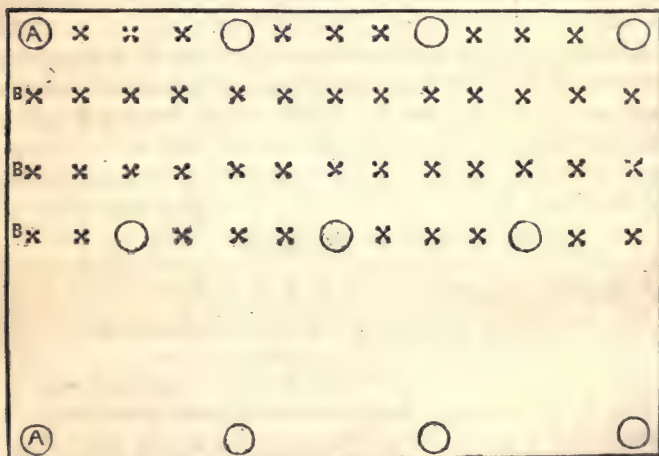
In this, or any other mode devised, fruits may be profitably combined, provided the necessary surface space be afforded to each, and suitable care and high culture be given to them.

PLAN OF COMBINATION OF FRUITS.

No. 1.

APPLE ORCHARD FILLED IN WITH DWARF TREES.

Fig. 120.



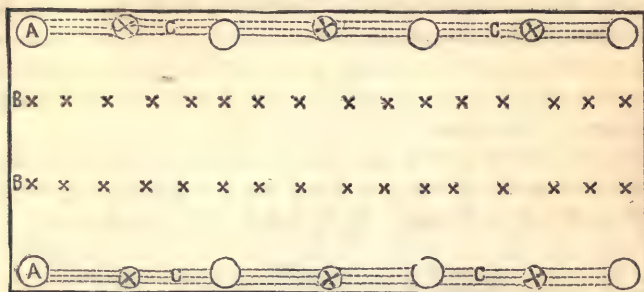
A. (Circles.) Apple-trees forty by thirty-four feet: area for each tree one thousand three hundred and sixty feet.

B. (Stars.) Dwarf apples, pears, or quinces, ten by eleven and one third feet: area for each tree one hundred and thirteen and a third feet.

No. 2.

PEARS, WITH STRAWBERRIES, AND CURRANTS OR GOOSEBERRIES, &c.

Fig. 120.



A, A. (Circles.) Pears twenty feet by twenty-two, or ten feet by twenty-two, standing along the centre of strawberry beds.

B, B. (Stars.) Gooseberries, or currants, or raspberries, four to eight feet apart.

C, C. Strawberries; bed four feet wide.

LABELING AND DIAGRAM.

All fruit-trees should be labeled when planted, and, in addition to this, a correct diagram of each plot should be prepared, so that at a glance the name of every variety you possess may be known. See page 215.

CHAPTER XVIII.

Pruning; various Objects, Periods, and Modes of.—Cleaning and Scraping Fruit-trees.—Fruiting; healthful Tendency to.—The Law of premature or forced Fruiting, and various Modes of its Application.

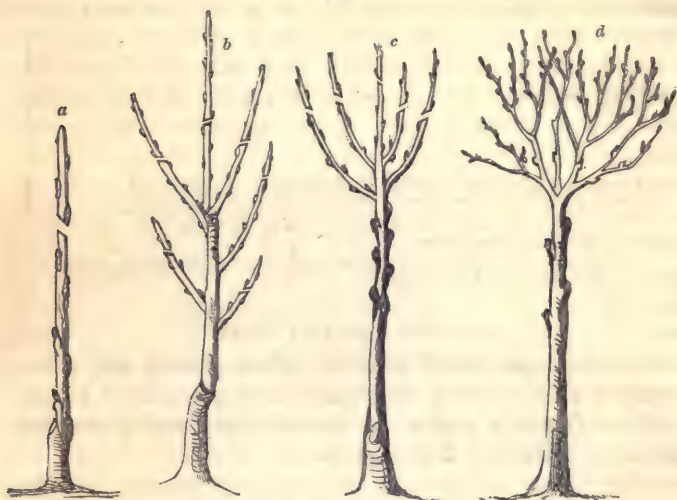
PRUNING.

WE prune to weaken and to strengthen, and often simply to balance—that is, to check or invigorate relative portions of the same tree or plant, to give it symmetry, or promote its blossoming and fruitfulness.

It becomes important clearly to distinguish the varieties of a process from which such varied results are obtained. The

one we will call winter pruning, though, for convenience, it is often done in the fall or spring; the other summer pruning, though performed from the first putting forth of the leaves in spring until the middle of the fall. In addition to which, there is the rarely performed operation of root pruning, which, though more immediately effective if done in August, may be performed at any season.

Fig. 131.



- a. A tree of one year's growth from the bud, cut back.
- b. A tree of two years' growth from the bud, cut back.
- c. A nursery tree pruned ready for setting out, showing the shoulders where the young branches have been cut off.
- d. An orchard tree ready to come into bearing, with the head opened by winter pruning.

WINTER PRUNING.

Winter pruning is the common shortening of seedling stocks when we transplant them into nursery rows, the cutting back and fashioning which we commonly perform in the course of their nursery culture and at their final transplanting, and the annual trimming throughout their mature growth, for forming and *strengthening* the tree.

In young trees it is generally called "cutting back," be-

cause the shoots of the previous year are shortened in the operation (Fig. 121 *a, b*).

The vigor of the subsequent growth is commonly in direct proportion to the extent to which this pruning is carried, heavy pruning being followed by strong growth, and vice versa. It is the natural tendency of the growth to push from the extremities, but the leading shoot of a stock three fourths of an inch in diameter at the butt, and four or five feet high, if left unpruned, may grow two feet or so upward in a season; if cut back to within two or three buds of the previous year's growth, it will usually more than double this growth, either in a single shoot or more; while, if cut down near the root for grafting or otherwise, or having been budded the previous fall, it will, with ordinary care, push upward a strong fine growth from five to nine feet, the roots also being strengthened by the operation. All winter pruning of young or old trees should be performed with as little injury as possible to the bark; every young shoot cut away should be taken off just outside the shoulder or swell at its base, leaving this upon the stem to heal over and strengthen the tree (Fig. 121 *c*). If severe wounds are made, coat them with paint, or pitch, or grafting composition, No. 3; or shellac dissolved in alcohol.

Winter pruning applied to trees after they are planted out to bear is chiefly intended to open the head for light and air, to allow of moving freely in the tree for gathering the fruit, and to keep its form symmetrical (Fig. 121 *d*).

EXCESSIVE WINTER PRUNING.

Sometimes, in neglected orchards, so much cutting seems necessary to open the head of the tree, and permit the easy gathering of the fruit, that an inexperienced cultivator is tempted clumsily to overdo the work; and this excessive and coarse pruning induces a strong upright growth of barren, gluttonous shoots, which, if left to grow, disfigure and injure the trees (Fig. 122, page 254). Let all your trees be carefully pruned while young, never permitting an ill-placed or a superfluous shoot to grow more than a single season at the most; and if pruning an orchard that has suffered from pre-

Fig. 122.



An old neglected tree that has been roughly over-pruned, and "gluttons" formed.

vious neglect, watch it, and prevent gluttonous growth by nipping and summer pruning. Winter pruning may generally be performed at any time between the first black frost in fall and the opening of spring; but the fall, except, *perhaps*, in climates of excessive severity, is greatly preferable for this purpose, the cuts being made at a little distance outside of the extreme bud left upon the branch.

SUMMER PRUNING.

Summer pruning is generally used to prevent an undue or unsightly growth in any one portion of the tree or plant, or to check its luxuriance, and thereby induce fruiting. It may be done to very great advantage by simply nipping with the thumb and finger, or with a pair of small pocket trimming shears, the young shoots that start improperly or with a disproportionate vigor. A child may do it with a toy knife, or a lady with her scissors, and make a marked improvement in the condition of a tree even in a single year, and save very much of the labor of winter pruning.

For this purpose, carefully watch the putting forth of the shoots, and if one threatens to cross another, nip it; if a number of young shoots are thrown inward into the head of the tree, thickening it up, nip them all out, so as to give to the young forming head the openness which you will find important when it comes into bearing. See Fig. 121 *d*, p. 252. If the leading upright shoot threatens to grow so strong as to discourage or prevent the formation of the necessary side shoots for a head, nip it, and thus throw the circulation into the side channels. If any one of the branches threatens to become gluttonous, growing with excessive, or, at least, disproportion-

ate vigor, and thus making a lop-sided tree, nip it from time to time, and compel or restore an equilibrium; and if it be in bearing, pluck the fruit while small from the weaker portion, and let it ripen upon the stronger. If your tree generally grow too luxuriantly, and you would encourage early fruiting, check its growth by nipping an inch or two from the points of all its branches in June, and repeat the process a month later if the tree does not appear to feel it, continuing this from year to year, with very light winter pruning.

To dwarfed trees that are to be kept in the bush form this mode of summer pruning should be thoroughly and carefully applied, every young shoot being nipped as soon as it has attained such a length as the cultivator judges sufficient for the season upon the individual tree, those of strong growth being allowed a foot at the utmost to each young shoot, but generally half this length will be found preferable. The young, tender second growth from the nipped extremity must be renipped, and the only winter pruning necessary should be the cutting off these weakened buds from the extremities so far as to furnish a full sound bud to start for the next season's limited addition.

If, however, the trees are to be "trained," running certain leading shoots horizontally, and treating them somewhat after the manner of spur-pruning the grape, the main young shoot of each may be allowed to lengthen more rapidly—say two feet in a season—all its side shoots being nipped as above directed for the bush form. See also pages 258, 512.

ROOT PRUNING.

Root pruning is an operation requiring great caution and moderation in its performance. It is effected by cutting off a portion of the roots at a distance from the tree, in order to check its growth and force fruit. It may be done by digging a trench around the tree and cutting the roots with a knife, or by encircling the tree partially or entirely with a deep cut, made by driving the blade of a post-spade to the depth of a foot or eighteen inches. In all ordinary cases the latter and less laborious process will suffice, with careful summer pruning,

to effect the end. The distance at which the roots are cut must be proportioned to the size of the tree, the object being to cut off only so many of its feeders as temporarily to stint its supply of sap. For a tree three inches in diameter, the cut may be made at a distance of three or four feet from the stem, and so on. August is a good time for the operation.

Root pruning is sometimes also resorted to for the purpose of restoring health to a tree that has become diseased from its deeper roots entering an unfavorable or poisonous subsoil. In this case a large opening is made on one side, and a sharpened spade driven with force under the whole central portion of the tree, whence the deep roots usually proceed. It should always be accompanied by high surface culture.

CLEANING AND SCRAPING.

At least once a year all bearing trees should be cleaned by washing or scraping, or both, from all moss and dead bark; and whether this be done in fall or spring, every portion of the scrapings should be gathered and burned, as well as all trimmings, of whatever kind, from trees infested by insects or diseased.

FRUITING.

It is common to speak of the "rapid" or "slow circulation of the sap," and of its "accumulation" and "more perfect elaboration," and the consequent formation of fruit-buds, as resulting from the retarded rate of its flow. I know of no such series of experiments upon the rate of vegetable circulation, with its variations, as might enable us to approximate to a safe conclusion upon the subject; nor do I find any thing in nature that might suggest or sustain the theory by analogy. It is also difficult to understand how cutting off the supplies in root pruning, or in any way retarding the flow of sap, should cause its accumulation (if the language quoted be accurately used), or how it happens that on mature trees with a habit of biennial bearing the blossom-buds are always formed in the year of their most free growth. They are also formed in the fall, at which period, according to Boucherie, as quoted by J. F. W.

Johnston, colored solutions reach the leaves through the circulation more rapidly than in the spring. The theory may be sound, but it does not seem so. If a branch be girdled to induce fruiting, it does not continue to bleed; its tubes may therefore be reckoned as closed at the descending end. If the mouth of a full siphon be closed, how can its contents "*accumulate*?" Or, if we may suppose the circulating power to be constituted by the combined forces of what we call the vital principle, temperature, and capillary attraction, then the first is strongest in the rapidly-growing but non-bearing tree; the second we may assume as equal at the period in which the matter of fruiting is decided; and the third ought to be greater in the tree of slower or less thrifty growth, for in this case the tubes are usually smaller and less open, and the capillary force is in an inverse ratio to the diameter of the tube in which it operates. We infer, therefore, that mere rate of circulation has little to do with, or by no means controls the question of fruitage, but that probably the fullness and character of the supply, in connection with the peculiar constitutional condition of the tree, governs the production of fruit, and not mere rate of movement. Or, if it be argued that the organizing matter accumulates, while the water is exhaled or perspired from the leaves, this should involve increased wood growth in the girdled limb, the contrary of which results, except to a trifling extent at the upper lip of the girdling cut, where it occurs in a manner similar in appearance to the formation of the "callus" at the buried end of a branch cutting. See Fig. 82 *e, f*, p. 197.

On page 66 of this work we have observed that the most marked feature of vegetable life is its tendency to reproduction.

All healthful vegetable growth moves toward this end in its appointed natural course, attaining maturity in a longer or shorter period, according to its peculiar constitution, as modified or affected by climate and other circumstances. As a corollary of, or at least in connection with this tendency to reproduction, we find what seems to be a law, that whenever, from any cause, there arises a probability of this result being defeated, or even a possibility that the individual may perish without accomplishing it, the tendency toward it is immediately

stimulated, and annihilation is avoided by a premature, though it may be feeble exertion of the reproductive powers.

I suppose a similar law to hold in reference to animal life, and that in the human family it may perhaps be taken to explain the remarkable though often impotent precocity of the deformed and dwarfed. It is true, the force and extent of an injury from which this possibility of annihilation arises may be such as to destroy these powers, so that the enfeebled blossom falls, and leaves no seed or fruit, or so to weaken them that, though the fruit form, it yet drops from the tree imperfect and worthless, but the law appears still to hold, and this is the law of which we take advantage when we would hasten the period of maturity or fruitage in the tree or plant.

The means and processes by which we call this law into action for the early or increased production either of flowers or fruit are very numerous and diversified, though they may all be classed as expedients for checking growth. Cramping the roots of plants in pots, with poor soil, or withholding water to an extreme at a certain stage of their growth, as often practiced by successful florists, are of this character. Transplanting also, whether more or less frequent. In young seedling trees of new kinds, the repeated grafting of the tree upon itself, continued from year to year, or grafting it upon the *spreading branch* of an old bearing tree; all the processes of dwarfing; ringing or girdling a limb; or, which is equally efficient and oftener practiced, the disbarking a large portion of a young orchard tree with the plow; or the severe action of insects; or summer pruning, by which we interfere with the circulation; setting in shallow and poor soil; or root pruning, by which we cut off the supply of sap; or constricting the vessels of a rampant limb by bending it; while the most ancient device known is to "bore a hole in the tree, and drive in an oaken plug."

Disease also, from whatever cause it may arise, has similar effects, and the sick tree yields fruit, or the sick plant runs up to seed more quickly than its healthful companions.

In annual or biennial vegetables there is no object to answer in materially hastening maturity. They all bear their seed or fruit in their season. But of the tree, slow in maturing, and

of longer life than ours, we become naturally impatient to enjoy the products, and hence these devices to hasten its season of fruitage. Our course to this result is plain. Any expedient which checks growth without immediately endangering the life of the tree will effect it.

The ordinary and legitimate means to the end are dwarfing (see that head), summer pruning in June and July, or root pruning in August, or any other period of the year; or we may combine these means, if the health of the subject prove obstinate.

Whatever course may be chosen for the accomplishment of our object should be accompanied by a free supply of manures of such kinds as may not be calculated to stimulate mere wood growth. See Manuring Fruit-trees.

On the other hand, if we would strengthen a tree, or any particular part of it, we ought not to allow it, or that particular portion of it, to bear fruit; we should avoid summer pruning, and carefully invigorate it by liberal shortening at the winter pruning.

CHAPTER XIX.

Diseases of Fruit-trees.—Insects injurious to Fruit and Fruit-trees, with Remedies.—Washes to destroy Insects.

DISEASES OF FRUIT-TREES AND FRUITS.

FRUIT CRACK.

THIS is first indicated by the stunted appearance of the fruit, especially on one side, upon which a black crack or "chap" opens. It is accompanied by dark blotches upon the fruit, which are probably formed by the growth of a minute lichen, the fruit becoming ill-looking and worthless.

This disease, or effect of disease, is found in the pear, particularly the Virgalieu; in the quince also, and sometimes in the apple. It seems to arise from a deficiency in the supply of appropriate food, and is generally curable by manuring and careful culture. It may always be assumed that fruits subject to it require and will bear high cultivation.

BLACK KNOT.

This disease, which has almost entirely destroyed the damson, the horse plum, and some other kinds, comes at first as a green swelling, bulging out and spreading open with a granulated appearance, changing in color till it becomes a black, wart-like excrescence, being, in fact, covered with minute black fungi, which grow and seed upon it. In general, unless arrested by cutting out, it continues to spread, either by lengthening itself upon the branch or body, or by breaking out at some other points. When the branch is cut off, the stain of the disease is found extending for some distance below the knot, in the substance of the wood or at the heart.

It is perhaps more prevalent upon dark-colored plums than on the yellow or green varieties, and has become common upon the sour red and Morello cherries.

There are variant opinions as to its origin and character, some supposing it to be caused by an insect stinging the bark, various worms being often found in the knots; others regarding it as a vegetable cancer; but all agreeing that the only method of treating it is to cut it clean off the branches, and perfectly out of the body and limbs in its early stages, and burn every vestige of the cuttings, washing the wounds with brine or a solution of copperas in the proportion of one ounce to two gallons of water, or covering them with grafting composition or shellac. Perseverance in this course will be found successful in arresting at least its worst results.

BURSTING.

The trunks of certain trees, particularly the cherry, sometimes open and decay upon the south side, a result attributable to the occurrence of severe frost after the warmth of the sun's rays has started the circulation upon that side. The full sap vessels, we suppose, burst mechanically, as a full water-pipe is burst by the same cause. Short stems help to provide against this difficulty, and trees placed so as to receive the slightest shade are seldom harmed.

LEAF-BLIGHT.

What is called leaf-blight in the pear, plum, etc., seems to be merely the result of a check given to the growth by heat or other cause, just as the hawthorn, refusing to acclimate well, annually loses its foliage in the summer or early fall, and becomes unsightly. It may be avoided in some measure, if not entirely, in fruit-trees, by good culture upon deep soils, moderately dry.

MILDEW.

Mildew is an appearance of mouldiness upon the young growth. Among fruit-trees it prevails upon some varieties of peach and nectarine, and upon grape-vines of foreign kinds. It generally follows a check in the growth by sudden change of temperature, etc., which is accompanied by numbers of a small aphid that punctures the back of the leaf and sucks the diseased juices; almost immediately the mildew proper appears, which seems to be a very minute vegetable growth.

It is removable by syringing or showering with a solution of an ounce of nitre to a gallon of water, with soap-suds, or lime-water, or any alkaline solution, or dusting with sulphur; but in respect to foreign vines can only be effectually met by renewing them every three or four years, either by layering from their own young shoots, or by young plants from other sources.

SOUR-SAP BLIGHT.

This disease is also called "fire blight," from the appearance of the tree destroyed by it; "frozen-sap blight," from the theory of its being the effect of frost upon the chemical condition of the sap in overgorged vessels, and by European cultivators the "canker," and is described by them as resulting from the sap being "corrupted by putrid water (*i. e.*, in the subsoil) or excess of manure," and as working like a gangrene on the parts affected.

It is a disease of surfeit or plethora, often appearing in the pith near the points of very vigorous offshoots.

The change in the sap, from whatever cause it may proceed,

would seem to be a kind of acetous fermentation, running on to putrefactive poison, which is carried, with the very death it represents and includes, as far as the amount of virus produced enables it to spread.

It nearly resembles the form of death that occurs so commonly in young fruit-trees when planted where an old one of the same kind has died.

Dwarfed trees, and those of moderate growth, as the Seckel and Lodge pears, &c., are seldom subject to it, but strong growers in moist rich soils suffer greatly, or are entirely destroyed by it.

The selection of the less vigorous varieties, and the choice of dry and only moderately rich soils for the stronger growing kinds, may be resorted to where a choice in either respect is practicable. But if this can not be had, then let a careful and persistent system of root-pruning be pursued, reaching especially to the roots that strike down into the subsoil. If the effect of this is seen not to be too severe upon the growth of the tree, and not otherwise, follow it with moderate summer pruning. Where it appears only in spots, the diseased portion should be thoroughly cut out and washed with ley, or a solution of copperas (sulphate of iron), and afterward coated with grafting composition No. 3.

YELLOW.

This is a jaundice or consumption in peach-trees, to which they have become liable within the last fifty years, constituting the only real difficulty in raising this fruit. It is variously accounted for, but no available remedy has been found. It has probably arisen from long-continued neglect of culture, combined with overbearing, the latter being incessantly stimulated, in addition to other causes, by the very weakness it produced. See Fruiting, page 258. A constitutional hereditary weakness, or disease, has thus been induced, which, when fully developed, becomes perhaps the very "essentiæ mortis," communicable by inoculation, as the virus of an animal body in a state of change, perhaps also by contact, or even by infection.

Its first and sufficient indication is the too early ripening of the fruit upon the tree, which as yet seems to be in health. This is followed, probably the very next season, by the growth of short feeble shoots from the obscure buds of the older branches, a change in the general aspect of the foliage, still more premature ripening or dropping of the fruit, which has now become darkly blotched with brown or purplish spots, beneath which the flesh is rotting, the tree becoming more and more sickly in its appearance until it dies.

The only known palliatives, or rather preventives, are moderate manuring, ordinary summer cultivation of the ground, so as to secure for them regular plowing, &c., which this tree feels almost as quickly as a cabbage ; the choice of an exposed situation, to avoid winter killing, to which, in northern latitudes, it is liable when thus treated in warm exposures ; and the annual cutting back of all young shoots to one half or one third the length of their last season's growth, with such other winter pruning as the condition of the tree may seem to require.

Severe winter pruning and good culture immediately after the occurrence of the first indication will, to all appearance, perfectly restore the tree ; but if these are discontinued, it returns the following season to its former state.

INSECTS INJURIOUS TO FRUIT-TREES AND FRUIT.

For general remarks upon insects and their habits, see page 94.

As certain plants are supposed to serve as a protection to vegetable crops, so certain essences, &c., hung in vials in the trees, have been suggested as a defense for fruits. For this purpose, the essences of peppermint, tansy, and pennyroyal are sometimes used ; also, spirits of turpentine against the rose bug, and ammonia as offensive to the plum weevil.

Decoys, or wide-mouthed bottles half filled with sweetened water, have been used with good effect for catching wasps and the larger bugs ; and it is said by a recent writer that these are much more efficient if the mouth of the bottle be closed, and an entrance made by breaking a hole in the side. Once in, the insects do not so readily find the way out.

For the protection of orchards, fires kindled in the evening, during the perfect or winged stage of insect life, are effective means. They may be made of brush or other rubbish, or small lighted tapers set in shallow pans of water may be used. Other processes for the prevention or destruction of insects are given under the proper heads.

APHIDES.

Fig. 123.



a, Flos Aphis; *b*, common Aphis, natural size; *c*, *d*, various common Aphides magnified.

FLOS APHIS,	<i>Aphis (Eriosoma) Lanigera.</i>
CHERRY “	<i>Aphis Cerasi.</i>
APPLE “	<i>Aphis Mali and Malifolia.</i>
GRAPE “	“ <i>Vinifera.</i>
ROSE “	“ <i>Rosæ.</i>

The Flos Aphis, Fig. 123 *a*, is called in Europe, erroneously, American blight. It is of a peculiar white, cottony appearance, and is met with in large or small bunches, or as single white spots, on forest and fruit trees, and not unfrequently upon the roots of the latter in the nursery. The floss-like appearance is caused by the white wavy or crinkled filament or tail of the insect, by the aid of which, though wingless, it is sometimes carried on the wind from tree to tree. An English writer prescribes washing with a mixture of sulphuric acid in ten times its measure of water. Tobacco smoke or infusion, or ley, or whale-oil soap; or for the roots, ashes mixed in the soil, are efficient remedies.

The cherry, apple, grape, and rose aphides, though distinguished by writers on insects, require no distinction in their practical treatment. Perhaps every infected tree or plant has its own peculiar variety, but all are remediable by the same means. They are invited by disease, and also cause it. The remedies are those named above for the Flos Aphis, applied in any way that may be found convenient.

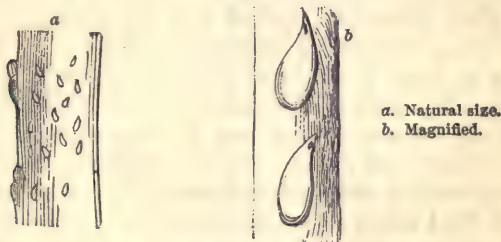
SCALE INSECTS, OR BARK LICE.

PEAR, OR WRINKLED SCALE INSECT. *Lecanium Pyri*.

Fig. 124.

APPLE SCALE, OR SHELL INSECT. *Aspidiodotus Conchiformis*.

Fig. 125.



These insects, which are sometimes called the "scale aphid," infest the apple, pear, mountain ash, and other trees and shrubs, appearing upon the bark like small white spots or scales, gradually multiplying until they sometimes cover the tree, some of the larger ones becoming brownish, and having a rough and angular, turtle-back appearance.

If the stem of a tree infested with them be rubbed harshly with a gloved hand, it will appear as if smeared with blood; and if the outer bark be shaved with a knife, the inner side of it will be found reddened with disease.

On raising these scales in the fall or winter, they are generally found to be pretty well filled with small reddish-brown eggs and the seeming remains of the insect, among which will sometimes be found a small worm. The scale which covers them is at this season of the year gray outside and silvery white within.

Like most other foul insects, they are found only upon trees that have first become unhealthy. Young apple or pear trees set in cold, wet soils, or injudiciously manured, or injured in their roots, or cracked by the borer; oleanders housed in a too cold or fluctuating temperature, and dusty, are especially liable to suffer from them. A variety known as *Aspidiodotus Rosæ* infests roses, &c. As any cause which stunts and diseases the young tree will invite these quiet but destructive pests, so any means that will restore health to the tree will banish them, among which close winter pruning, digging about it, and applying compost or liquid manure from time to time, will be found most efficient; and, as preliminary to these, let the scales be crushed with a hard brush or rubber of any kind, and the tree or plant thoroughly washed with the ley-wash, or whale-oil soap wash, or a strong infusion of tobacco. See page 284. Let this be done in early spring, and repeated in summer if necessary. If, however, the subsoil be wet, and especially if it be at the same time level, and have the character of hardpan, the insect will return, and only draining, or deep plowing, or subsoiling, with moderate manuring and annual planting with hoed crops, as potatoes, corn, &c., at the same time leaving the trees abundant clear space, and using the above remedies as they may seem to be required, will be likely to carry them successfully past the period of danger. The smaller birds destroy many of these insects, but are not numerous enough to keep them in check.

WORMS OR LARVÆ.

APPLE-TREE BORERS.

Fig. 126.

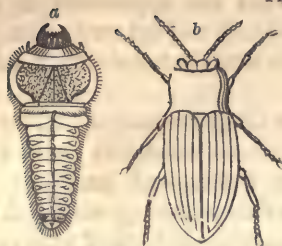


a. Larva.

b. *Saperda bivittata*, or two-striped beetle.

Borer and parent bug.

Fig. 127.



a. Larva.

b. *Chrysobothris* (*Buprestis*) *femorata*, or thick-legged snapping beetle.

Infesting apple, quince, and some forest trees.

Borer and parent bug.

The parent beetles of the above are of very dissimilar appearance, though the worms are alike in habit.

The *Saperda* is about three fourths of an inch long, of a light butternut-brown color, and most easily recognized by its two rather broad white stripes extending the whole length of the insect. It flies chiefly at night.

The *Chrysobothris*, or snapper, is described by Fitch as "an oblong, brassy-blackish snapping beetle, nearly half an inch long, its back under the wings brilliant bluish green." It is most active at midday.

Both deposit their eggs in June or July upon the bark, generally near the ground, and the worms, when hatched, eat their way first to the inner bark, where they may be found in August or September, of the size of a wheat-kernel. Eating downward, they reach the sap-wood, which, with the inner bark, they destroy extensively. They finally enter the solid wood, and eat their way upward, living in the tree some two years. When the period of their change approaches, they make their way toward the outer surface, forming their chrysalides within the bark of the tree, from which the beetles make their escape in early summer by eating through.

Borer, Fig. 126 a, larva of the *Saperda*, is a soft, full, fleshy, yellowish-white, cylindrical worm, about an inch long, of the diameter of a stout straw, or a little larger, of even thickness throughout, or scarcely at all tapering. It has a brown head and black jaws, and is marked into thirteen joints or segments. Upon these, both above and beneath, is a row of obscure, wart-like protuberances, which, with the spiracles or breathing-holes

along its sides, give it somewhat the appearance of being striped. It is slightly hairy, footless, and not very active, rolling itself in its progress, but is very destructive to the fruit-trees it infests.

Borer, Fig. 127 *a*, larva of the *Chrysobothris*, or snapper, is a pale yellow or very light wood-colored worm, less than an inch long, ringed or jointed as the former, and somewhat more hairy. It is soft, and generally flabby-looking, with dark head and jaws, not very prominent, immediately back of which it has a flattened and curiously-marked enlargement or pair of heavy shoulders, from which the body or tail tapers rapidly to a point. It is, I think, even more injurious than the former, but both require prompt and thorough attention.

In addition to the voluntary labors of the downy woodpecker, who is an active and laborious hunter of the young larvæ, various means of destruction are available.

The beetles of both kinds should, as far as possible, be destroyed, the *Saperda* by means of brush fires in the orchard at evening, and the snapper by catching with the hand. Scrape the bark around the butts of the trees in August, carefully burning the scrapings, and destroy the young worms by a thorough washing with ley or coating with soft soap. Watch for the first fresh castings of the worm while small, and either cut him out, or pass a wire or pointed flexible gutta-percha probe up the hole to pierce him, or stifle him with camphor plugged into the hole, or with the fumes of burning sulphur, if they will reach him, or with an awl open the upper end of his burrow and pour in scalding water, as suggested by Dr. Fitch.

Piling ashes or lime around the trees in spring, or coating the butts for eight or ten inches with pitch or grafting composition, will also be found useful.

BUD WORM AND PARENT MOTH.

Supposed to be Larva of Loxotenia Rosaceana.

The moth is generally about half an inch long, and of a light brown color, but variable. When at rest, a quadrangular figure is formed by several narrow brown bands upon the wings.

The bud worm is a small greenish worm with a dark head, found just after the trees start to grow, rolled in the very tip of the young shoot, which it eats entirely away; and later in the season, the same worm, or one resembling it, is found rolled into the rose or grape-vine leaf. He is an exceedingly active, mischievous-looking fellow, watching keenly for an intruder, and dodging quickly into his retreat when you approach him. They are not very numerous. I have supposed them to proceed from eggs which are found deposited singly or in small numbers in the perforated bark of the young shoot close to the buds, though the *Loxotenia* is said to deposit her eggs upon the bark.

Remedy: catch and crush him; also gather the eggs.



CANKER WORM AND PARENT MOTHS.

Fig. 129.



The male moth is of a pale ash color, with darker spots or shadings. The female is dark ash-colored above and gray beneath; the latter can not fly, having mere winglets.

The CANKER WORM is a dusky-brown or ash-colored worm, ten footed, and about an inch long, very destructive to apple, elm, and other trees. The moths leave the ground in very early spring, and a few may get out in the fall. They seek the trees in March, or at the first opening of spring, the female crawling up and laying her eggs in the crotches and branches. These hatch in the latter end of May, and the worms spread over the tree and ravage it, sweeping an orchard like fire where they are very numerous.

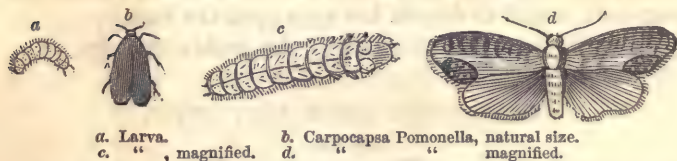
Remedy: banding the tree carefully with Dennis's patent leaden oil trough, or any substitute for it which you can de-

vise ; a projecting strip of leather fastened edgewise to the tree and oiled ; a tarred band around it ; or a thick, broad belt or band, coated with India-rubber melted by heat, which is quite adhesive, but does not harden.

The birds destroy large numbers of them, and Harris says there is a splendid ground-beetle that watches for and catches them as they come down from the trees ; various parasites also disable the larvæ, and destroy the eggs to a considerable extent. See also page 96.

CORE WORM AND PARENT MOTH.

Fig. 190.



Moth small and grayish, with a large brown spot on the hinder part of the fore wings ; the smaller wings and body yellowish brown ; the texture of the wings appearing like watered silk.

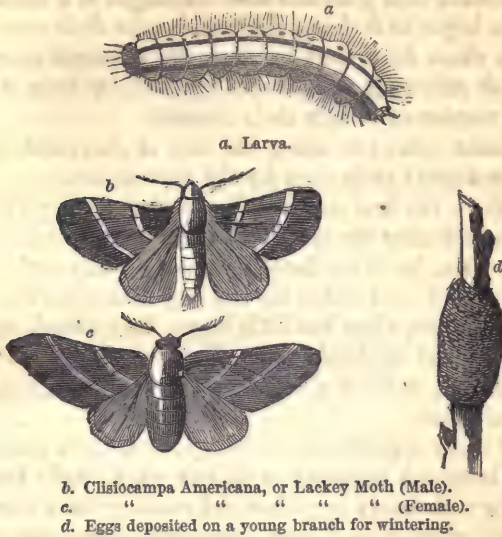
The core worm is a small, flesh-colored worm or grub ; found in the apple-core, sometimes causing the fruit to drop prematurely from the tree.

When the apples fall, if not before, the worm leaves the fruit, and hides in the crevices of the bark, to spin and wait for the return of spring. The moth comes out in all June, and immediately deposits her eggs singly in the eye of the young fruit. They hatch in a few days, and the young worm proceeds to eat in to the heart.

Remedy : scrape the bark in the early spring, and burn the scrapings. Let hogs run in the orchard to eat the falling fruit, and every day gather what they do not eat and boil them, or feed them to other swine. Old cloths in the crotches of the trees or lying loose around will furnish hiding-places in which the worms may be caught by looking them over weekly ; also evening fires in the orchard in moth-time will destroy many.

NEST WORM, WITH PARENT MOTHS AND EGGS.

Fig. 131.



The livery or lackey moth takes its name from the colors which mark its larvæ. Its own color is a dull-red or fox color, with two white parallel stripes across the wings, the male moth being rather darker than the female. It is about an inch and a half across when expanded. The worm, when full grown, is nearly two inches long, with a black head, the body being variously lined and spotted with black, blue, yellow, and white.

This, which is called "tent worm" by Harris, is pre-eminently the apple-tree worm of our country from Maine to Texas, though it affects still more the wild cherry, and is sometimes found upon other trees to a limited extent. Its eggs are set on end, head outward, being glued together with softish gum-mucilage, and varnished over with the same. They may be found at any time during winter upon the young shoots, forming a band around them nearly an inch broad, and of a slate color, Fig. 131 d.

These are hatched by the warmth of May, each nest of eggs producing a pretty numerous colony of worms, which at first are not thicker than pins, and half the length of a wheat grain. They soon begin to feed and grow, and make their nest, changing their skins from time to time, and strengthening themselves and enlarging their dwelling, until in June they mature and wander off to spin their cocoons.

The moths come out about the first of July, and in a few days after deposit their eggs for the next season.

Remedies: the first and best is to collect the eggs for burning in the fall after the trees lose their foliage, and if not attended to then, let it be done in winter or very early spring. The second best is to watch for the very first sign of the formation of the nests, when but little larger than a hen's egg, and, choosing a moist or cloudy day, either cut off and burn them, or, armed with a thick glove, crush them; though so small, they are all there.

But, if these opportunities are neglected, there remains the ordinary laborious attempts to do late what might have been done early with ease: to gather and crush or burn them when nearly full grown; to sponge them with ammonia; to burn them in the nest; to twist them out with a pronged stick, or swab them with turpentine, most of which can be but partial remedies.

It has an enemy in a parasitic insect, the small white cocoons of which are often found attached to those of the worm. For the destruction of the moth, evening fires of brush or tar in the orchard at moth-time, continued for a week or two, are most effectual.

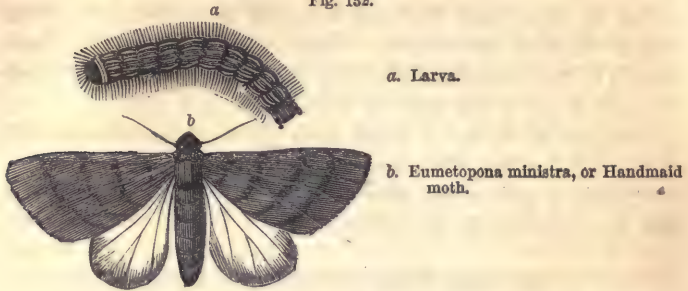
Dr. Fitch suggests that perhaps the wild cherry might be advantageously used as a natural decoy for the protection of valuable orchards, being planted near, and perfectly cleared of the eggs every fall or winter. It would seem worthy at least of a trial.

NET WORM AND PARENT MOTH.

The color of the moth varies from yellow to brown; the wings are crossed by four or five darker bands, and spotted

with small specks of the same. It is orange colored or yellow about the head and throat.

Fig. 132.



The net worm, or yellow-necked apple-tree worm somewhat resembles the nest worm, but comes later in the season, and, instead of spinning a compact nest, weaves a net over the limb on which it is feeding, and spreads it as its range enlarges, eating chiefly the tissue of the leaf in preference to its veins.

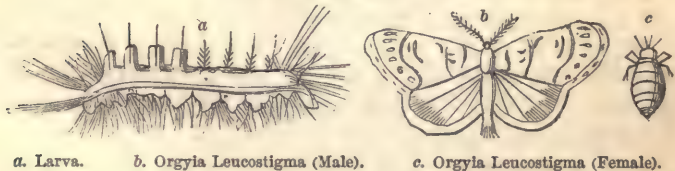
The eggs are deposited in clusters upon the back of the leaf, near the end of the shoot, and number usually from seventy to a hundred, which are hatched from the middle of July to the middle of August.

They are generally by no means so numerous as the nest worm, but more injurious in proportion to their numbers.

Remedy: watch for their first weaving, and immediately crush them; or cut off the limb and burn it.

NOTCH WORM AND PARENT MOTHS.

Fig. 133.



Moth of a dingy brown color, the female being wingless.

The notch worm is a pretty, slender, sixteen-footed worm, about an inch long, with pale yellow hairs and tufts, and black

hair pencils, the head and two spots on the back being coral red.

The small round white eggs of this species may be found rolled up in a dead leaf, and hanging upon the ends of the shoots through the winter. They hatch early in May, spin mostly in the latter half of July; in about two weeks the moth appears, deposits her eggs in a few days, and dies. It is not a numerous kind, but is found upon the rose, the wistaria, &c., eating notches into the edges of the leaves.

Remedy: gather and destroy the eggs in March or April, and catch and crush the worms.

PALMER WORM AND PARENT MOTH.

Fig. 134.



a. Larva.

b. *Choetochilus Pometellus*.

The moth about three fourths of an inch across when spread. It is generally of an ash-gray color, sprinkled more or less with black, but varying very much in different seasons.

The worm is described by Fitch as of a pale yellowish green, with a dusky or black stripe along each side of the back; and two other lines, the one being whitish, and the other dusky, with a shining yellow head like beeswax.

They travel and feed scatteringly upon the tree, and drop and hang by their spun threads when it is jarred.

When in force, the palmer worm is much more destructive than the nest or net worms, and in some sections and seasons becomes a scourge. It feeds in June. The moths come out about the second week in July.

Remedy: drenching with water, or with whale-oil soap wash; also evening fires in the orchard in moth-time.

Many of them are destroyed by a small footless parasitic grub.

CHERRY WORMS OR SLUGS.

The parent of this worm or slug is a small glossy black fly, with transparent but cloudy wings, reflecting the colors of the rainbow. It appears about the first of June upon cherry and pear, and sometimes apple trees.



Fig. 135.
Larvæ of *Selandria* (*Blenncampa*) *Cerasi*.

Its eggs are deposited in small punctures, generally on the under side of the leaf, and begin to hatch in fourteen days. The young are at first white. They grow to be about half an inch long, becoming greenish, and of a watery and sticky appearance, and eat the tissue of the leaves.

Remedy: dust the foliage thoroughly with lime or dry wood-ashes when the dew is on, or syringe with whale-oil soap wash.

These, with their kindred species infesting roses and grape vines, undergo various moultings, and sometimes eat up their cast skins. Their changes are completed in about four weeks, when they are yellow and free from slime; and soon after enter the earth. Mice, moles, birds, and their own natural parasite are their enemies.

CURRANT WORM, OR BORER.

LARVA OF *PSENOCERUS SUPERNOTATUS*. LARVA OF *AGERIA TIPULIFORMIS*.

These worms eat into the pith of the currant stem, and weaken or destroy it. They are not very numerous except in certain localities, and are easily managed if all sickly and dead branches are promptly cut off close to the ground or the main stem, and burned.

GOOSEBERRY WORM.

This is a round-bodied and curiously-marked measuring worm, about an inch long, having ten legs—six in front, and four behind.



Fig. 136.
Larva of *Phalena Grossularia*.

It eats away the leaves of the bush, and also is often found rolled in them like the bud worm. He suspends himself by a thread in descending from the bush.

Remedy: gather the worms by hand and destroy them.

SMALLER GOOSEBERRY WORM.

LARVA OF CECIDOMYA GROSSULARIÆ, OR GOOSEBERRY MIDGE.

The midge is scarcely one tenth of an inch in length, pale yellow, with wings that appear glassy.

The eggs are deposited in June in the young berries, which color prematurely and drop off, the young worms, which are yellow and of an oval form, occupying the rotten inside.

Remedy: gather all premature and dropped fruit, and boil or burn it.

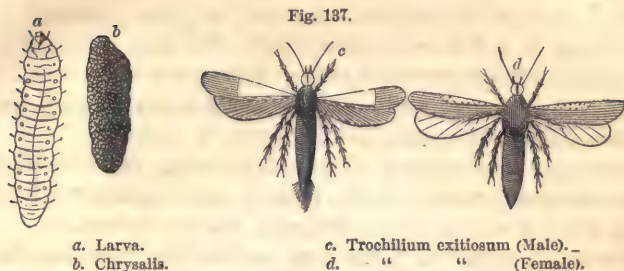
GRAPE WORMS.

Besides the bud worm, mentioned p. 268 as infesting the grape-vine, there are other worms, more rare, but perhaps not less injurious, which trouble it. They are the larvæ of various kinds of *Philampelus* or *Sphinx* moth, and either eat the leaves or cut the unripe fruit from the branches. The vines should be watched, and the depredators caught and destroyed. The grape slug, larva of *Selandria* (*Blennocampa*) *vitis*, is similar to the cherry and rose slugs, and may be destroyed by the same means, as may also the minute brown or greenish larva of *Hal-tica chalybea*, or grape-vine jumper, which sometimes feeds upon the young blossoms, and thus destroys the crop.

The vine borer, *Trochilium polistiformis*, which is peculiarly destructive to grape-vines at the South, is so similar in its appearance, habits, and transformations through all its stages to the peach borer, *Trochilium exitiosum*, that it may perhaps be doubted if there is a really specific difference between them. All remedies for the one are available against the other.

PEACH WORM, WITH ITS CHRYSALIS AND PARENT FLIES.

The peach fly, which in its season may be seen busy about the trees, is a small wasp-like fly, of lively habit, rather more than half an inch long. The wings of the male are transparent, those of the female a bright steel blue; the bodies of both are of this color, the female having a cross belt of orange. Its eggs are deposited during the latter part of summer in the



bark of the peach-tree, just at the surface of the earth, where it is kept tender by contact with the soil. The worm hatches in a few days; then eating its way to the inner bark, and doing more or less injury in the fall, according as it may have been hatched earlier or later in the season, it winters there.

The warmth of spring renews its activity, and if several eggs have been deposited in one tree, the worms will pretty well girdle it by the end of May, about which time they begin to form their cocoons, the outside of which is usually covered with the sawdust-like castings of the worm.

There are various easy remedies: merely banking up the earth, or piling wood or coal ashes or slaked shell lime a few inches high around the trees early in the spring, first examining them and removing any worms that may be found, and again taking away the ashes or earth in the fall. Or if the earth be removed to the depth of three or four inches, and a coat of pitch or grafting composition No. 3, page 239, put on with a brush from this depth below to an equal distance above the surface level, replacing the earth that may be removed so as to leave the pitch collar about equally under and above ground, no fly will be able to deposit the egg, and of course no worm will be found in the root. One such application will last for several years, even in trees growing vigorously. They should, however, be examined every spring, in case the fly may have found an opening made by the swelling of the tree. For this a single glance is sufficient, as the presence of the worm is always, at this season, indicated by the exuding gum. The forks of the principal branches also require attention, the worm being often found in them when excluded from the root.

The ravages of this worm may not only be prevented, but they may be defied and counteracted. We may stimulate the growth of a peach-tree so that it will form new bark faster than the worm can eat it, while its foliage may retain the deep green color of vigorous health, and its fruit be magnificent. This, however, is a dangerous though interesting experiment, the fullness of sap induced in the process exposing the tree to the risk of being winter-killed; but with a hardy variety, and upon a northwest exposure, it has been successfully performed, with the worm working unchecked and severely to the height of eighteen inches above the ground. Any one may repeat it who will plant a peach-tree upon a slope in such an exposure, and set a hog-pen six feet above it.

PEAR-TREE WORM AND PARENT BEETLE.

Fig. 138.



- a. Larva, magnified.
- b. *Scolytus Pyri*, or pear-blight beetle, magnified.

A very small beetle, of a deep brown color, with paler legs. Wing covers with obscurely-punctured rows.

The worm is minute. It eats into the smaller limbs of the pear-tree, and, reaching the pith, works from that centre until a narrow section of the wood is eaten out to the bark, forming a circular cell, and the limb above the point of the injury droops and dies suddenly.

Remedy: cut off the limb and burn it the moment you perceive the leaves to droop.

PLUM WORM, WITH PARENT BUG.

Fig. 139.



- a. Larva.
- b. *Conotrachelus Nenuphar*.
- c. *Conotrachelus Nenuphar* at work upon a young plum.

The plum worm is the larva of a small winged insect known as the curculio. It is a small dark brown or blackish beetle or bug, somewhat resembling in size and appearance the pea bug, except that it is rather more lightly built, and has a small dark raised spot or hump upon each wing. It makes its appearance late in the time of blossoms, and soon after the young fruit sets it cuts up upon it a small semicircular piece of the skin with its minute but keen forceps, and, leaving this like an apron, deposits a single egg beneath it, and close to its inner line. Protected by its slight covering, the egg is hatched in a few days, and the young worm eats its way until it reaches the pit. The fruit sickens and drops from the tree, generally before it is half grown, more or less of it continuing to drop until the time of ripening, when one side of the falling fruit is usually found to have rotted.

When the fruit falls the worm leaves it and hides itself in the earth, to return in its winged form in time for the next year's crop. Those that enter the ground as early as June and July are supposed to pass through their changes and reappear in the fall, and some think they all come out before winter, and, failing to find their favorite fruit, deposit eggs for the spring brood in the bark of the young shoots of plum, pear, or peach trees. Dr. Fitch seems to favor this view, which, he says, was held by the Rev. F. V. Melscheimer, of Pennsylvania, fifty years ago, and is just now revived.

This is one of the most fatally injurious of our insect enemies, and there is really no known and certain preventive or remedy. Sowing salt sparingly around the trees, say a quart to a tree, spread over a space twenty feet square, is useful not only as being offensive to the insects, but also conducive to the health of the tree. Ashes and soap-suds will also be found in this respect valuable. Sulphur, though useless when inserted in the tree, may be of service sown over it, repeating the dose if it is washed off by rain; or, syringe the whole tree heavily, as soon as the fruit is formed, with wash No. 5, page 284, and, if rains occur, repeat it weekly till the stone of the fruit hardens.

Early in the morning they are comparatively helpless, and

may be caught by spreading a sheet under the tree, into which they will fall if the tree is suddenly jarred by a smart stroke with a mallet upon its body, or by a blow with a hammer upon the end of the stump of a branch cut off for this purpose, which may remain from year to year, being covered in the intervals of its use with grafting composition No. 3, p. 239.

When the insects drop they instantly fold themselves up as closely as possible, and appear like the small dead buds or scales that fall with them, so that to secure them the whole gatherings of the sheet should be burned or scalded.

Careful attention given to the trees in this manner from the time the fruit sets until it is one fourth grown will generally secure the crop; but the most promising known mode is to pave closely under the trees, with clam or oyster shells if more convenient than other material, or plant them so that their tops lean over water; the instinct of the insect leading it to avoid depositing its eggs in fruit from which, when they drop, its progeny can find no safe retreat. As, however, the destruction of these marauders is chiefly to be aimed at, jarring the tree and catching them is the more efficient mode.

Whatever else is done, however, the falling fruit should be gathered up daily and boiled or burned; mere scalding should not be trusted. Hogs, unless starved, will not eat them. Hens with broods of chickens destroy numbers of the young worms where the ground is clear, so that they can scratch freely, but are not to be expected to extirpate them, especially if there are hiding-places near.

This insect, or some other of similar habit, infests the cherry and the apple; the cherry, however, does not drop as the plum, and in the apple the young worm does not seek the heart of the fruit, as the core worm, but burrows around irregularly just under the skin, so that when peeled the apple shows a net-work of brown lines.

WINGED INSECTS.

SEVENTEEN-YEAR LOCUST, OR CICADA SEPTEMDECIM.

Of this remarkable insect there are quite a number of separate broods or swarms, each having its particular section or district. They do not appear simultaneously. The northern-

most brood, occupying Eastern New York, a part of Connecticut, with a portion of New Jersey and Pennsylvania, appeared last in 1843, and is therefore due in 1860; while the brood occupying Western New York, and Pennsylvania, and Eastern Ohio, appeared last in 1849, and is due in 1866.

They are a little larger than the common summer locust (*Cicada canicularis*), and their note, though similar, is stronger and more shrill.

They are black, with red eyes and transparent wings and wing covers, the edges and veins of which are orange red, and having the peculiar dark zigzag line resembling a W, which superstition regarded as an omen of coming war in times when wars were so frequent that it could never be mistaken.

They appear suddenly in the month of June, coming out of the ground as if in a single night. At this time they are in the pupa state, being incased in a thin transparent membrane or shell, which in a few hours after they reach the surface cracks open along the back, and the perfect insects come forth. They are at first feeble and sluggish, but soon gain strength, and the males, who alone carry the music, make the woods resound with their shrill notes.

The chief apparent injury done by them is in depositing their eggs in the young branches, particularly of oak and apple trees. This operation is performed by cutting up the wood of the branch in successive thin slices or splinters, very much as in old times a carpenter commenced the opening of a long, narrow mortice; under these splinters a double row of eggs is set, to the number of fifteen or twenty; similar nests are formed until all the eggs are deposited, one individual depositing four or five hundred. Most of the branches die above the wound, and snap off with the wind either before or after the eggs are hatched, the whole operation becoming a very se-

Fig. 140.



vere summer pruning, which in some cases threatens serious injury, though in others the unsightliness produced is the only evil.

The young larvæ, when first hatched, are about one twentieth of an inch long, yellowish white in color, with eyes and claws tinged with red. They immediately drop from the tree, unless the branches have previously fallen, and enter the ground for their long imprisonment, and are supposed by some to do extensive though unseen injury to the roots of trees during their progress to their mature condition.

They are peculiarly a woodland insect, not being produced upon the prairies of the West, and disappearing from cultivated fields. Certain insects, birds, and probably vermin, destroy them in their various stages, so that, although the number hatched seems incalculable, they do not, on the whole, advance in numbers, but probably rather recede.

ROSE BUG, OR MACRODACTYLUS SUBSPINOSA.

Fig. 141.



a. Insect perfected.

b. Eggs as deposited
in the earth.

This is an insect of the beetle tribe, about half an inch long, of a yellowish-brown color, having, like the May-bug, a pair of gauze wings protected by hard coverings, and large feet that feel like claws when they touch the skin. They appear suddenly in June, and continue for a few weeks, when the females crawl into the ground, where they deposit about thirty eggs, which are whitish and almost globular. These hatch in about twenty days, and the young grow to their full size before winter. At the approach of severe weather they descend into the ground below the reach of frost, and become torpid. Reviving in the spring, and working their way back to the surface, undergoing in the mean time some changes, they come out to their accustomed work at the usual season, all prepared for mischief.

They are voracious yet dainty feeders, preferring the blossoms of the rose and the grape, and the ripening fruit of the cherry, which they utterly destroy; but when these can not be had, stripping the linden and cherry trees of their

foliage, sometimes hanging in clusters upon the denuded branches.

Like most other insects, they have enemies. The darning-needle, perhaps some birds, and domestic fowls to a limited extent, destroy them. The latter are said to be sometimes injured by them; it may be from irritation of the throat, &c., caused by their rough claws.

They are generally so numerous, however, that these enemies make no perceptible diminution in their ravages, nor has any effectual remedy for them been found. Net coverings are, of course, a perfect defense, and grape-vines may be protected by sowing plaster freely over them in the morning when the rose bug first comes, repeating the application if washed off by rain. It seems to annoy and stupefy them, perhaps interfering with their respiration. It does not, however, destroy them; the only process which really effects this is to gather them by hand into a pan of water every morning, or beat them into sheets spread to catch them, and either crush, or drown, or burn them.

This process is made easier by being performed at once on their first appearance. They are then found mostly in pairs, and are sluggish and readily caught.

VARIOUS WASHES TO DESTROY INSECTS.

Washes to destroy insect life are mostly either saline, or poisonous, or alkaline, and, unless used with caution and moderation, become also dangerous to the health or life of the plant to which they are applied. It is better to use them in the evening or in cloudy weather than in bright sun, and to repeat the application than to make it only once and too strong. Should this be done by accident, water immediately and freely.

NO. 1. BRINE WASH.

This may be made either a saturated solution, as the old brine of meat-barrels, or weakened by adding one third water. In either case, apply it moderately with a swab or brush to the bark of strong trees only. It destroys some insects and much fungous growth.

NO. 2. SOAP-SUDS.

Suds made strong, either with hard or soft soap; the product of the wash-tub; they may be freely and safely applied as above directed, and ashes may be added to strengthen them, if necessary.

NO. 3. LEY WASH.

1 pound potash or soda.

4 gallons of water.

Dissolve thoroughly, and apply it moderately with a swab or brush at the approach of rain. It destroys eggs and insects. If used for the scale or shell bark-louse, use a hard brush, or a Manilla glove, or swab, or a rubber of the coconut husk.

NO. 4. SOFT SOAP WASH.

This is either common soft soap of the stores smeared on to the tree, or laid in its crotches to be washed gradually over it by the rains, or it is this diluted with an equal measure of water, or twice its measure of the tobacco water, No. 6.

NO. 5. WHALE-OIL SOAP WASH.

2 pounds whale-oil soap.

15 gallons water, or tobacco water, No. 6.

To be well stirred, and applied with swab, brush, or syringe.

If 6 ounces of flour of sulphur and 12 quarts of clear lime-water be added to the above, it will be nearly similar to a wash strongly recommended by A. P. Cummings, Esq., of the New York Observer, as effective against the curculio. To make the lime-water, pour about 4 gallons of water on 2 quarts of quick-lime, stir it, and let it settle.

NO. 6. TOBACCO WATER.

1 pound refuse tobacco.

10 gallons of water.

If the water be poured on when boiling, and it be repeatedly stirred, it may be used when cool.

If cold water is used, let it stand in a vessel for a week before using, stirring it often.

It may be applied in the usual manner, or the plants or young shoots infested with the aphis may be dipped into it for a few moments, and, after draining off, should be thoroughly showered with clear water.

NO. 7. TOBACCO WASH.

2 pounds leaf or cut tobacco, or common snuff.

2 pounds potash or soda.

20 gallons of water.

Boil and stir it till reduced to about fifteen gallons. Stir it immediately before using it, and apply it cool with a brush or swab for the destruction of the scale insect.

NO. 8. SULPHUR PAINT.

1 pound flour of sulphur.

6 quarts of soft soap.

Reduce to the consistence of paint with tobacco water No. 6. Apply it with a brush or swab to trees infested with the scale insect or bark louse, and if a hard brush or rubber is used, so much the better.

NO. 9. SULPHUR WASH FOR GREEN-HOUSE PLANTS, &c.

1 pound soap.

$\frac{1}{2}$ pound sulphur.

$\frac{1}{4}$ pound Scotch snuff.

1 ounce powdered nux vomica.

3 gallons of water.

Boil and stir it for half an hour; let it cool.

Dip the plant into it for a few moments, or apply the wash with a sponge or brush. Place the plant so that the wash will not drain into the pot, and in fifteen minutes syringe or shower it thoroughly with clear water.

FIELD MICE.

In light warm soils field mice are often very destructive to young fruit-trees by girdling them at or near the surface of

the earth, particularly when the snow lies long upon the ground, or the grass is suffered to grow thickly around the trees, or if they are mulched in the fall, so that nesting-places and materials are furnished.

Digging round the trees in the fall, and keeping them clear, may often prevent the injury. The snow also should be trodden hard around them. If these precautions are not found sufficient, a coat of pitch, or grafting composition No. 3, may be put on for six or eight inches above the ground, and an inch or two below. In cases of great exposure, pieces of lath set on end firmly around the stem, and tied on until spring, will protect them; or rolled tin or thin sheet iron may be sprung around them, which, if carefully dried in spring and put away, will last for years. A good cat or small terrier dog will hunt them pretty effectually, and black snakes are said to catch them.

If trees are severely injured, or even entirely girdled, they may yet be saved by making three or four clean, smooth cuts across the girdle, just as you would cut to put on a patch bud-graft, but broader, and fitting nicely to them corresponding pieces cut from the same or some other tree, as you would cut the bud from its scion; and it will aid you in the operation if a little wood is taken with the bark, so that you can ever so slightly interlock them with a short tongue, as in grafting. Having put on two or more of these, according to the size and necessities of the tree, bind them carefully and firmly, and cover them completely with grafting composition No. 3, and your tree will live.

CHAPTER XX.

Fruits in alphabetical Order, in their Varieties, with Descriptions and Directions for their Culture.

FRUITS.

IN preparing the following selections of the more important fruits, an effort has been made to limit the number of varieties, and yet not exclude any desirable peculiarity belonging to

either class. The lists comprise but fifty kinds of apples, forty of pears, twenty-four of peaches, twenty-five of plums, and sixteen of cherries.

These may appear meagre assortments from the almost innumerable existing varieties, but the wants they will not meet are not likely to be satisfied by the mere multiplication of kinds. Neither, though carefully chosen, are they given with the idea of selections being rigidly confined to them; other kinds of similar character may be substituted for any or all of them, at the pleasure of the cultivator.

ALMOND.

Amygdalus Communis.

The almond is a variety of the peach, or, more properly, the peach is an almond improved by cultivation, the almond consisting only of the pit or nut and the skin, which cracks open when ripe.

They are raised and cultivated in all respects as peach-trees, and will generally succeed in a measure where that fruit will ripen, but are best suited with a warm soil and southern climate.

The bitter almond and the peach-pit alike afford prussic acid, but the large sweet almond is an excellent nut, though hard to digest, on which account it should be eaten with raisins.

There are also double-flowering varieties, the dwarf double being a universal favorite, easily increased by offshoots or layers.

Seedlings of the bitter almond are used to some extent in France as stocks for budding peaches on, being thought hardier and more enduring than seedlings of the peach.

Fig. 142.



a. A branch in blossom.
b. " " in fruit.

APPLES.

The varieties of apples are so numerous and diversified that while it would seem as if all tastes, soils, and localities might be suited, there is, on this very account, some difficulty in making a selection.

In addition, therefore, to the information given in the subjoined lists of kinds, and the suggestions in reference to the selection of fruit, page 192, little aid can be afforded in making choice of varieties.

In general, and particularly to the northward, except for localities within easy reach of a market, it will be found wise to plant the late fall and winter varieties more largely than the earlier kinds, and acid or subacid fruits rather than sweet ones.

In respect to soil, some varieties will not bear a sandy, and others will not do well upon a clay soil, but almost every variety will succeed upon a moderately deep loam, if the climate of the locality is such as to suit them; and even upon soils comparatively cold and wet, good fruit may be raised if attention is given to carrying off the superabundant water by means of open drains made with the plow. Efficient under-draining will be found still better, and all land having clay or hardpan underneath, upon which the orchard is to be planted, if not under-drained, should first be thoroughly subsoiled or trench-plowed.

In orchard culture, in good soils, apple trees should not stand less than forty feet apart every way. When dwarfed for garden culture or for combination they may be set from ten to twelve feet apart, and should be regularly summer pruned by nipping the ends of the young shoots through the season, and in the winter pruning should be cut back only just enough to preserve the vigor and symmetry of the tree. See *Pruning*, page 253-4.

Apples have become of late, more than ever, one of the necessities of life, and every person should, if possible, so arrange the varieties selected as to secure to his family the enjoyment of them throughout the year. This may be accomplished by

the choice of a very few first-rate kinds, such as in their times of ripening will just overlap one another, beginning with the earliest, and running through to the latest variety.

Those intended for keeping, whether of the summer and fall or winter and spring varieties, should be gathered a little before they become ripe, and be carefully stored in a cool, dry room or cellar. By this means the earlier kinds may be kept into the fall, and fall varieties until near New Year.

In gathering the general crop, the russetings should be picked first, and in succession the other late-keeping varieties, back to those intended for early winter use, unless we may except from this order any particular variety which, if left upon the tree, might be in special danger from winds.

From necessity, apples are sometimes buried or binned in mass; but it is better, if possible, to store them in headed barrels, in a dry, well-aired cellar, sorting out all that are defective at least once during winter. For those of choice varieties or of special beauty, each fruit should be wrapped in thin Manilla paper, and placed by hand singly and closely in the barrel, filling in as you go, if convenient, with dry chaff, or buckwheat bran, or powdered charcoal, or plaster, or clean dried sand, or tasteless, inodorous sawdust. All these, however, may be dispensed with, simply heading the barrel well up, and handling it carefully.

The general modes in which apples are used need not be enumerated here; but the daily use of them in the form of baked, or rather stewed apples, is so generally agreeable, and so conducive to health at those seasons when other fruits can only be had in the less wholesome form of preserves, that it may be recommended for universal adoption. For this purpose, the apples are selected perfectly sound and free from worms, and are either washed or wiped clean, and placed in a covered pot or stewpan, with water and molasses in the proportion of a quart of the former and a gill of the latter, or four table-spoonfuls of sugar to half a peck of fruit, adding orange-peel, or sliced lemon, or ginger, or other flavoring according to taste. They are then boiled over a slow fire until the remaining sirup is about equal to the quantity of molasses used at first, the fruit being

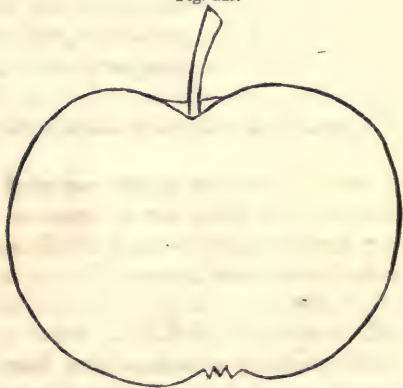
watched and changed from top to bottom, to give each apple a chance for perfect and equal cooking, which will ordinarily be accomplished in about an hour.

SELECTION OF FIFTY KINDS.

The varieties named below are arranged nearly in the order in which they will be found to ripen under equal circumstances in any given latitude. Their general times of ripening at New York are stated, in order to afford a kind of fixed point from which to calculate for other localities. They are classed as small, as the early strawberry; medium sized, as the Vandervere; or large, as the fall pippin; in respect to flavor, as acid, subacid, and sweet. Apples and other fruits are liable to vary considerably in form, coloring, and general appearance, as well as quality and flavor, in different soils and climates, but in general the outlines will afford an accurate idea of their figure.

1. EARLY MAY.

Fig. 143.

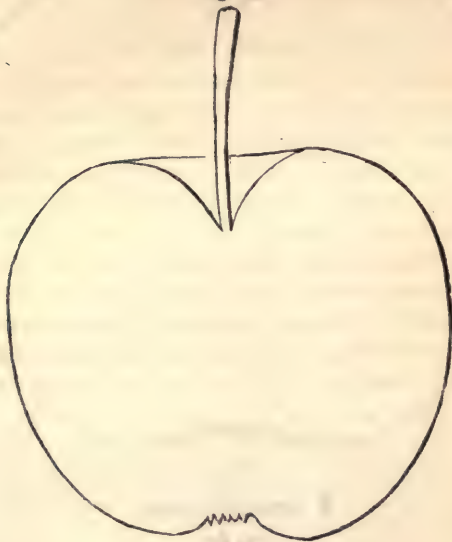


Tree of moderate and rather upright growth, forming a pretty compact head, and bearing well.

Fruit very small, almost round, green, becoming yellowish white when ripe. Flesh white, tender, and not very juicy. Flavor mild subacid. Ripens about the last of June at New York; its name is Virginian.

2. EARLY STRAWBERRY.

Fig. 144.



Tree erect, and of medium vigor ; young shoots dark ; a free bearer.

Fruit small, roundish or semiconical, yellowish green, with some lively red stripes ; ripens about the middle of July. Flesh white, sometimes slightly veined with red. Flavor sprightly, subacid, with some little aroma.

3. EARLY HARVEST (*Fig. 145*).

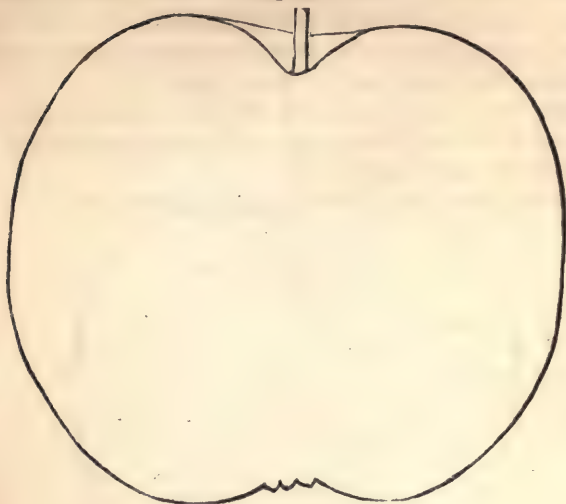
Tree very thrifty, making numerous long shoots, forming a rather spreading yet bushy head that requires thinning. Needs and deserves high culture.

Fruit above medium, round, skin very smooth, greenish white, changing to straw color as it ripens.

Flesh white, tender, crisp, and juicy.

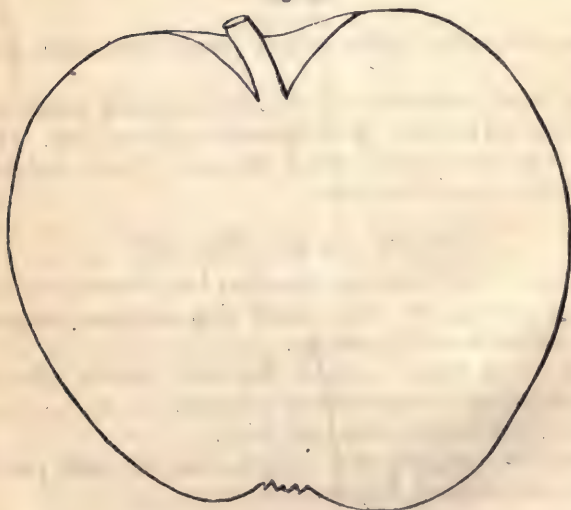
Flavor fine sprightly acid. Ripens from the latter part of July to the middle of August.

Fig. 145.



4. SWEET BOUGH.

Fig. 146.



Tree of moderate growth, making a rather round head, and bearing fair crops. Young shoots yellowish.

Fruit above medium ; roundish, to obtuse conical ; yellowish-white, with occasionally a blush cheek.

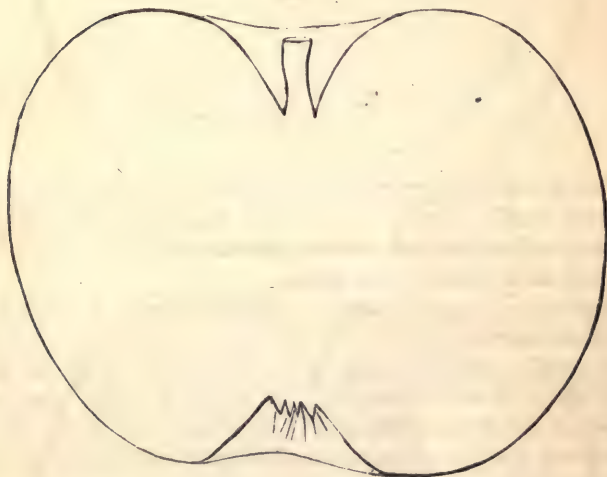
Flesh white, tender, and tolerably juicy ; skin tough.

Flavor a fine, rich sweet, especially when permitted to mature perfectly upon the tree.

Ripening from last of July to middle of August.

5. RED ASTRACHAN.

Fig. 147.



Tree a fine, vigorous grower, rather upright, and round head ; hardy and productive in almost every variety of soil and climate.

Fruit above medium ; roundish ; flattened ; greenish-yellow in the shade, but mostly bright crimson, overspread with a fine white rich bloom.

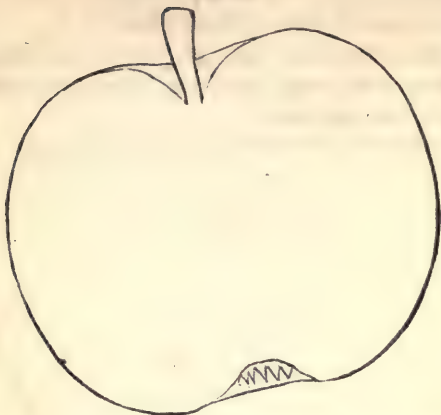
Flesh pure white, tender, and crisp, with an abundant juiciness, which it loses if it be not gathered early.

Flavor a brisk and rather sharp, but agreeable acid.

Ripens in July and to the middle of August.

6. SUMMER ROSE.

Fig. 148.



Tree of moderate growth and roundish form, bearing well.

Fruit small, roundish, somewhat flattened, pale yellow, blotched and striped with red on the sunny side.

Flesh white, tender, and juicy.

Flavor fine, pleasant subacid. Ripens early in August, and continues for some time.

In certain localities, where it may have been tested, the Benoni, which is an eastern apple of about the same size and season as the Summer Rose, may be substituted for it. It is a deep red fruit, of pleasant subacid flavor, and the tree grows and bears well.

7. WILLIAMS'S FAVORITE.

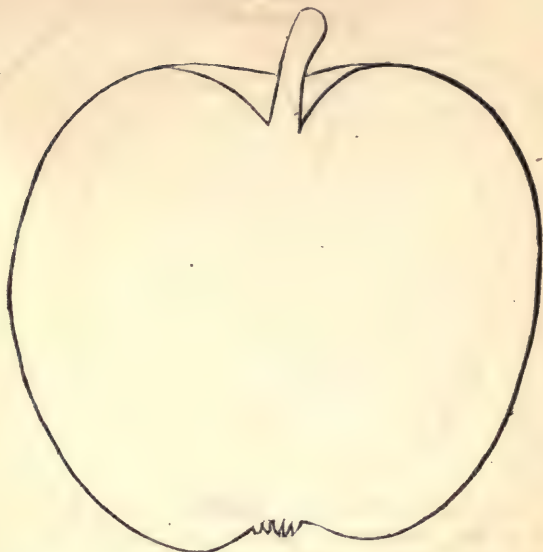
Tree of medium vigor, and good bearer, but greatly benefited by deep soil and high culture.

Fruit of medium size, sometimes pretty large, oblong-ovate, inclining to conical, almost covered with bright red stripes, deepening to crimson in the sun; a fruit of fine appearance.

Flesh yellowish-white, moderately juicy and tender.

Flavor mild, agreeable subacid. Ripe in August.

Fig. 149.

8. SUMMER PIPPIN (*Fig. 150*).

Tree of strong growth and spreading habit; young shoots light brown; a fair though not heavy bearer.

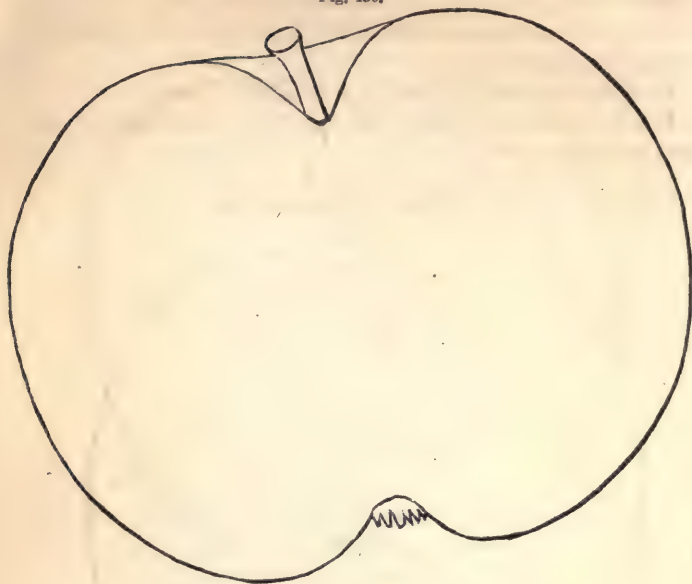
Fruit large, roundish, deep golden yellow; liable to crack when over-ripened on the tree.

Flesh white, tender, juicy.

Flavor fine clear acid. Ripens irregularly through August and September, or later.

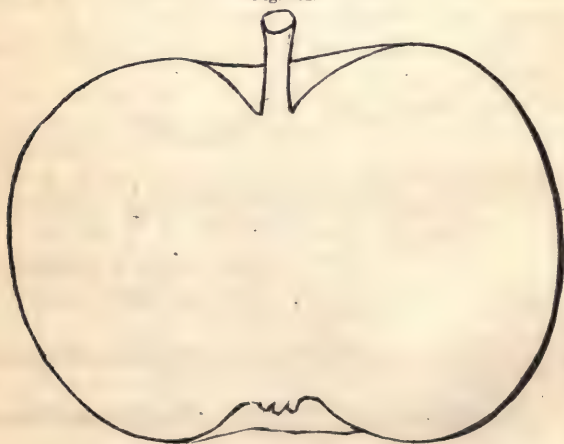
The Summer Pippin, which, on trees in full bearing, does not usually average the size represented by the figure, is valuable as a family fruit, where it can be used for cooking, as it matures along through the fall, but its irregularity in ripening renders it less suitable for marketing. It is a rather old and favorite variety, extensively known as the Holland Pippin; but, except in certain localities, or with persons who have a particular fancy for it, other newer and more desirable varieties will supersede it.

Fig. 150.



9. GLOUCESTER CHEESE.

Fig. 151.



Tree strong-growing, compact, and bearing well.

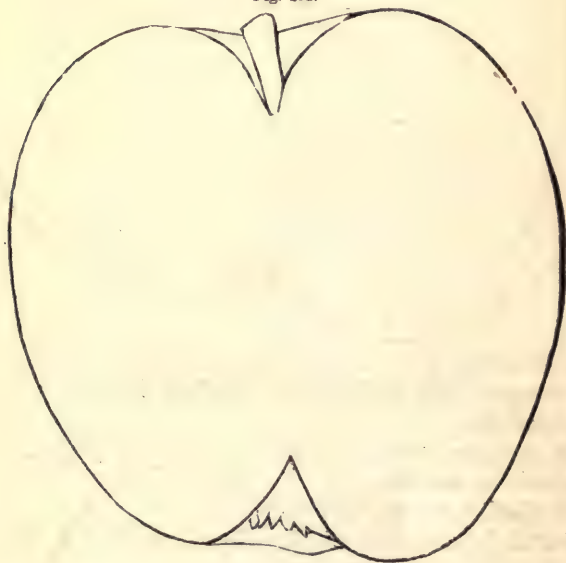
Fruit large, roundish, flattened; bright red, with indistinct stripes of a lighter shade.

Flesh white, crisp, but mealy when over-ripened.

Flavor mild subacid, agreeable and rich. Ripening in August and September.

10. AMERICAN PEARMAIN.

Fig. 152.



Tree appearing strong and vigorous, yet really of rather slow growth; somewhat spreading, and a good bearer. It is suited with a sandy soil.

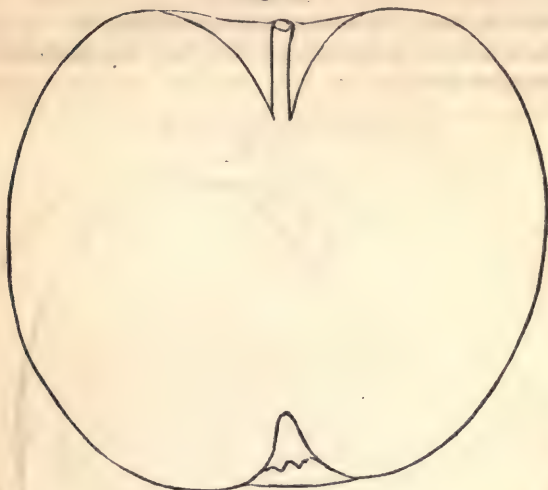
Fruit rather large, oblong; greenish yellow, with some thin russet; dull red on the sunny side, obscurely striped and clouded.

Flesh yellowish, and pretty firm, with slight mealiness when quite ripe.

Flavor mild, rich subacid. Ripens in August and September.

11. JERSEY SWEETING.

Fig. 153.



Tree of strong growth while young, making a rather upright, compact, rounded head, and bearing abundantly. Not a long-lived tree.-

Fruit medium, roundish, conical, greenish-yellow, with blush cheek, or striped.

Flesh whitish, tender, and juicy.

Flavor high, rich, and sweet. Ripening through August and September.

12. MAIDEN'S BLUSH.

Tree of pretty strong spreading growth, and an abundant bearer.

Fruit somewhat above medium, flattened, or nearly cheese form; clear light yellow, with a brilliant blush cheek.

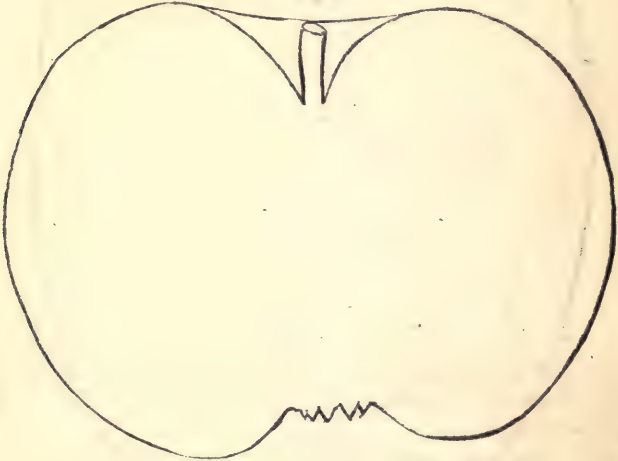
Flesh white, crisp, very tender and juicy.

Flavor moderately acid. Ripens from August to October.

The Maiden's Blush so nearly resembles in appearance and character the Hawthornden, a favorite Scotch apple, that it is

difficult to avoid the conclusion that the one is a sub-variety of the other ; the latter is a little fuller in the eye than the former, but both are beautiful, productive, and valuable. Their clear, but not strong acid, fits them for making pies of special excellence, and for this purpose they may be gathered from early summer to quite late fall ; they are also, on account of their form and character, superior for peeling and drying.

Fig. 154.



13. PORTER (*Fig. 155*).

Tree erect, and of fine, rapid growth, requiring care to keep the head sufficiently open ; healthful, and a good bearer.

Fruit medium, or above ; regular oblong conical ; yellow, with red upon the sunny side.

Flesh white, tender, juicy.

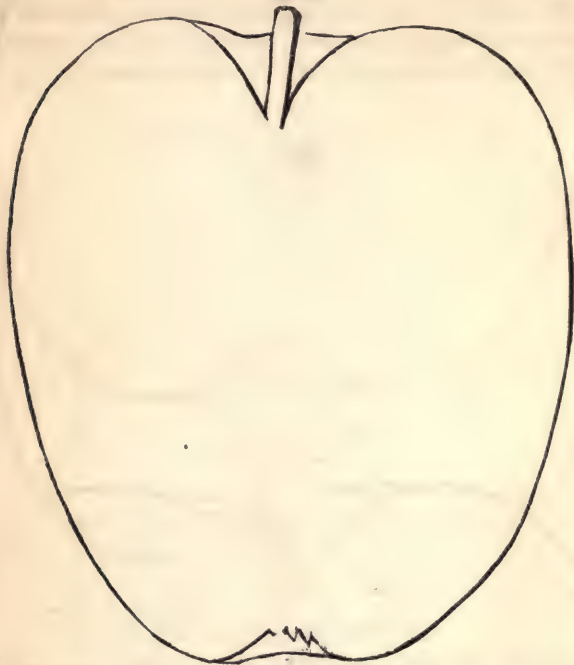
Flavor fine mild subacid to acid.

Ripens in September and October.

The Porter is a favorite in Boston and vicinity, and succeeds well throughout the North, where it is used both for eating out of hand and cooking ; for the latter use, the Keswick Codlin, which in general form and color somewhat resembles it, may be profitably substituted for it at the West. It is a heavy

bearer, even upon young trees, and, like the Maiden's Blush and Hawthornden, may be used throughout the season, or dried for winter and spring.

Fig. 155.



14. GRAVENSTEIN.

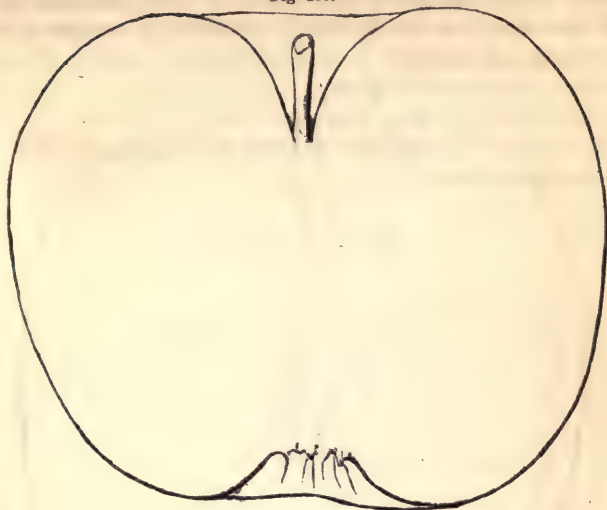
Tree of vigorous growth, and regular though expanding habit. A good bearer.

Fruit large, roundish, flattened; yellow, with orange portions, splashed and marbled with much red, having also a few green dots.

Flesh yellowish-white, crisp, and juicy.

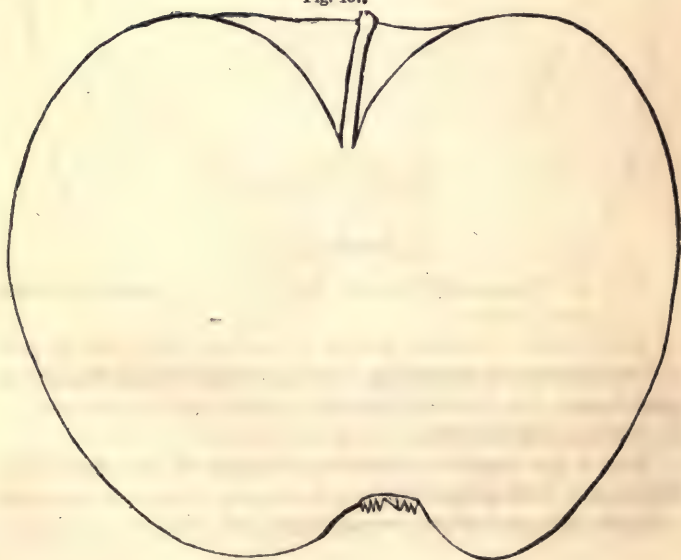
Flavor fine subacid to vinous. Ripens in September and October. It deserves and finds favor every where as an acquisition to the garden and orchard.

Fig. 156.



15. HAWLEY.

Fig. 157.



Tree strong and spreading ; a good and constant bearer.

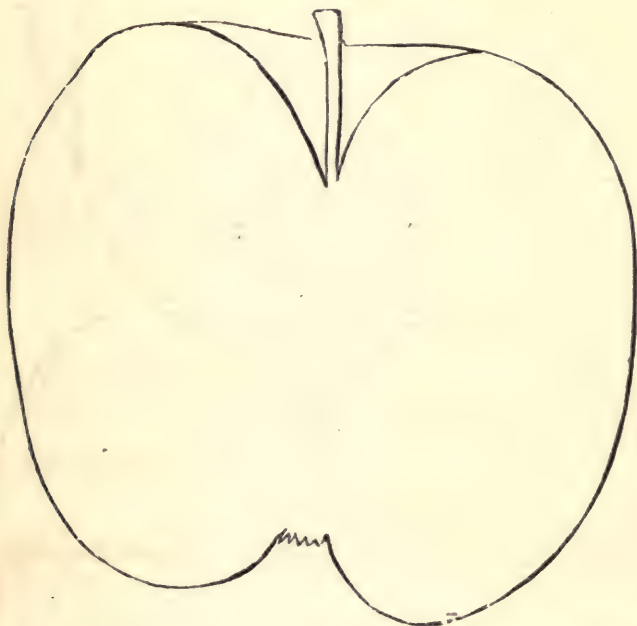
Fruit large, round, flattened, occasionally unequal-sided ; yellow, sometimes with a slight blush ; in certain soils and localities subject to bitter rot.

Flesh yellowish, firm, crisp, and juicy.

Flavor fine rich subacid. Ripens in October, and keeps to the middle of December.

16. FALL PIPPIN.

Fig. 158.



Tree strong and spreading ; mostly crooked while young ; a good bearer, but apt to be imperfect unless under good culture and in a genial climate.

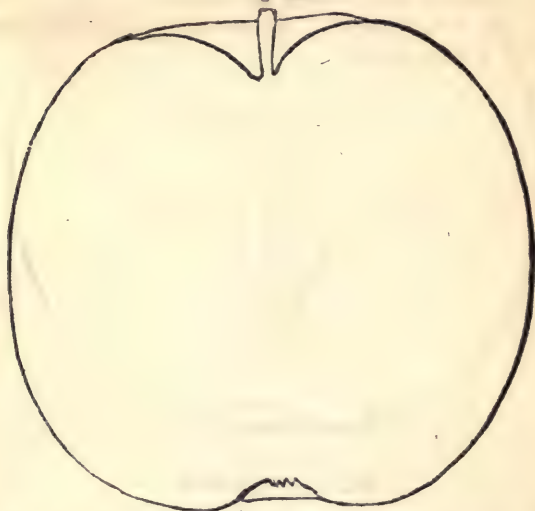
Fruit large, roundish, sometimes slightly ribbed ; clear yellow, rarely with a faint blush.

Flesh yellowish-white, tender, firm, and juicy.

Flavor high, aromatic, rich subacid. Ripens from October to December.

17. FAMEUSE.

Fig. 159.



Tree of only moderate vigor, with dark shoots; rather spreading; with good soil and culture it bears well. It is suited to northern latitudes.

Fruit medium or below, fair, roundish; greenish-yellow, streaked and blotched with various red.

Flesh very white and tender.

Flavor light acid, with some perfume. Ripens from October to December.

18. MOTHER (*Fig. 160*).

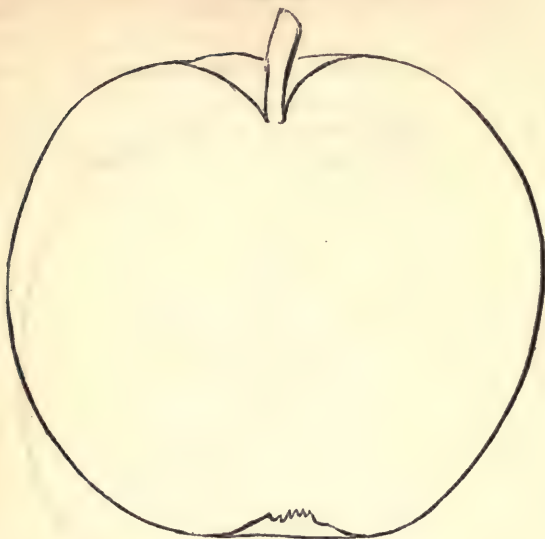
Tree of moderate growth, bearing well and constantly.

Fruit medium or above, roundish, oblong, or conical; rich red upon yellow, with deeper red on portions of the sunny side.

Flesh yellow, tender, and juicy.

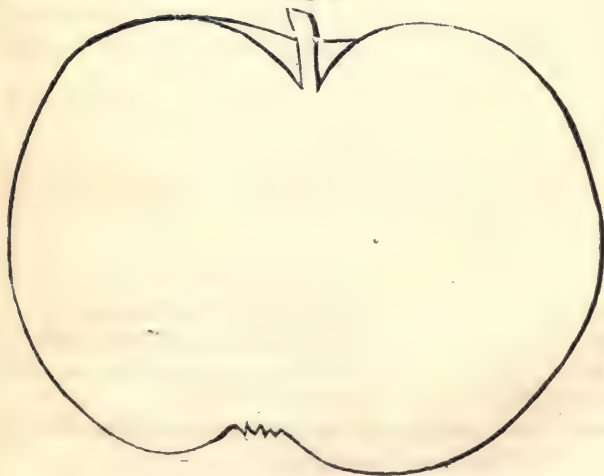
Flavor of a mild subacid, sugary character, rich and spicy. Ripens from October to January.

Fig. 160.



19. VANDERVERE.

Fig. 161.



Tree rather spreading, a moderate grower, and a good bearer in warm soils and localities ; much benefited by high culture.

Fruit medium or above, roundish-flattened ; yellow or orange, with much red in the sun, but variable, being sometimes wax-like and of exquisite beauty.

Flesh yellow, firm, and not very juicy.

Flavor mild, rich subacid, of the highest quality. Ripens from October to January.

20. DYER.

Fig. 162.



Tree of spreading habit and but moderate growth ; a tolerable bearer.

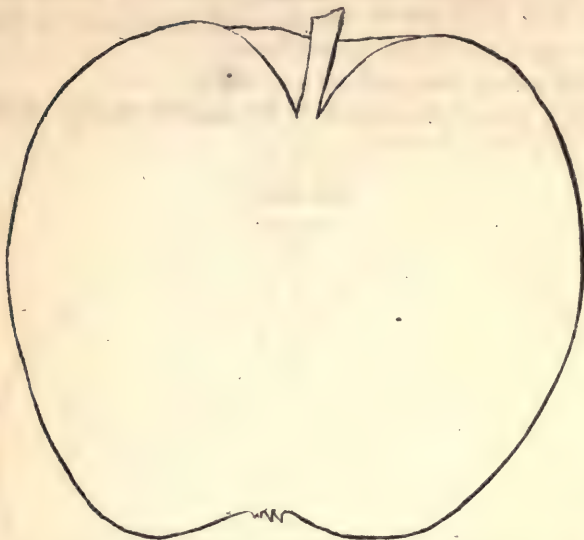
Fruit pretty large, roundish, slightly flattened ; whitish, with a faint blush.

Flesh yellowish-white, crisp, and tender.

Flavor mild, sprightly subacid : excellent. Ripens from October to January.

21. HUBBARDSTON NONSUCH.

Fig. 163.



Tree strong, with expanding branches, and rather slender, grayish young shoots ; an abundant bearer.

Fruit above medium, roundish-ovate ; yellow and orange, almost covered with red stripes, and having in general a little russet near the stem.

Flesh yellowish, firm, tender, and moderately juicy.

Flavor fine aromatic subacid. Ripens from November to January.

22. MINISTER.

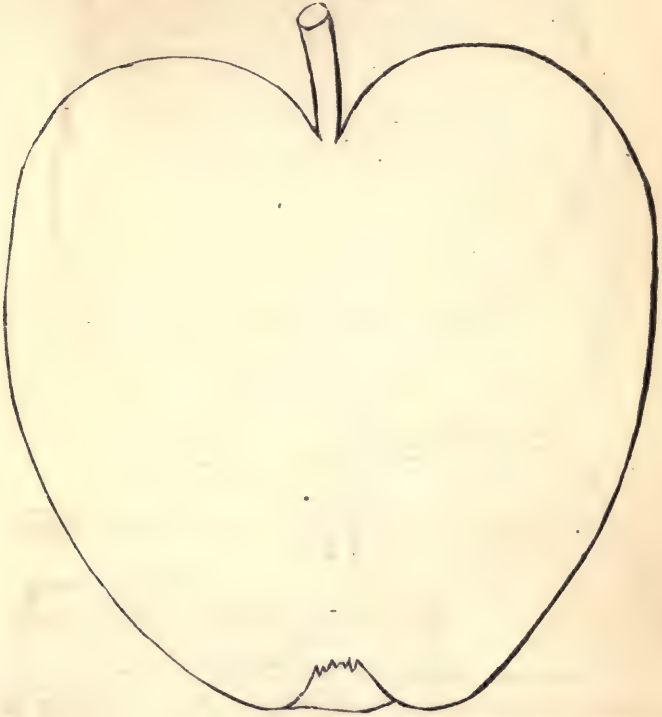
Tree moderately free in growth, with flexuous young shoots ; very productive.

Fruit above medium, oblong-ovate or conical ; greenish-yellow, striped and dashed with red.

Flesh yellowish-white, so tender as to require special care in handling.

Flavor pleasant, having a certain resemblance to the light, sprightly acid of a natural or wild fruit. Ripens from November to January.

Fig. 164.



23. HURLBUT (*Fig. 165*).

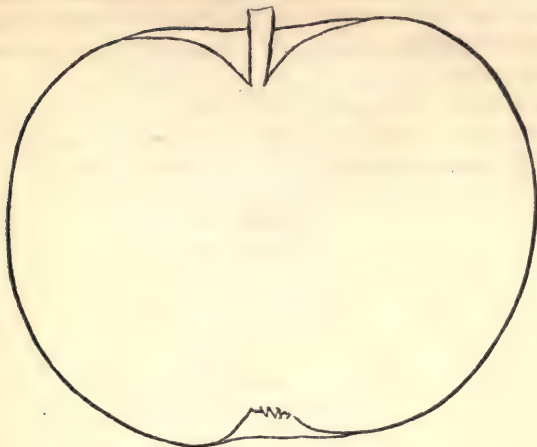
Tree of vigorous growth, and a great bearer.

Fruit medium or below, roundish-conical; yellow, almost covered with rather deep red, and having some russet around the stem.

Flesh yellowish-white, firm, not very juicy.

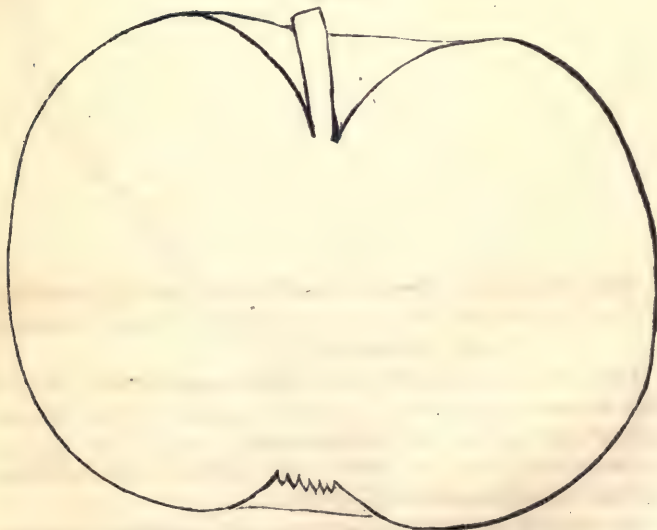
Flavor mild subacid, slightly aromatic, and very pleasant. Ripens from November to January.

Fig. 165.



24. MALE CARLE.

Fig. 166



Tree pretty strong, but varying much in its growth with

soil and climate ; a pretty good bearer ; suited to warm latitudes.

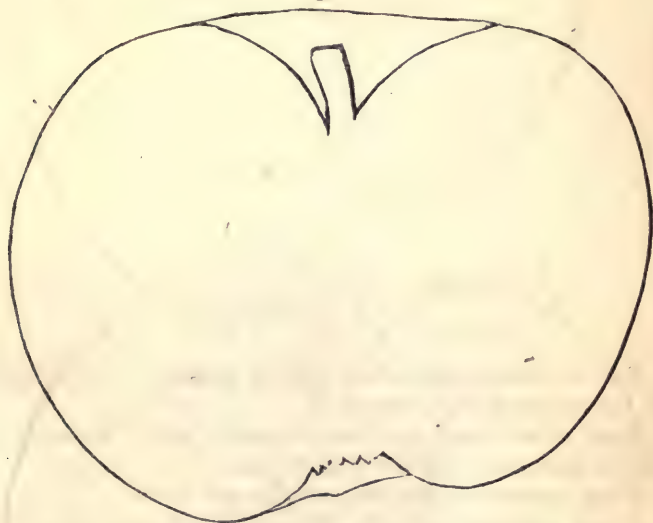
Fruit medium to large, nearly globular ; light yellow, with crimson cheek.

Flesh white, fine-grained, and tender.

Flavor rose perfume, mingled with a fine subacid. Ripens from November to January.

25. CHANDLER.

Fig. 167.



Tree of moderate growth, but bearing heavily, requiring high culture and thinning of the crop while young to avoid a large proportion of imperfect fruit.

Fruit large, round, flattened, oblique ; covered with dull red upon a greenish ground.

Flesh white, firm, and rather coarse.

Flavor mild subacid, rather rich, pleasant, and excellent. Ripens from November to February.

An apple of very fine appearance and character when perfect.

26. PECK'S PLEASANT.

Fig. 168.



Tree a moderate and rather compact grower, and good bearer, but requiring high culture.

Fruit rather large; roundish, flattened; yellow when ripe, with a blush cheek and a few gray dots.

Flesh yellowish-white, juicy, tender, and crisp.

Flavor a fine high subacid. Ripens from November to February, or later.

27. JONATHAN.

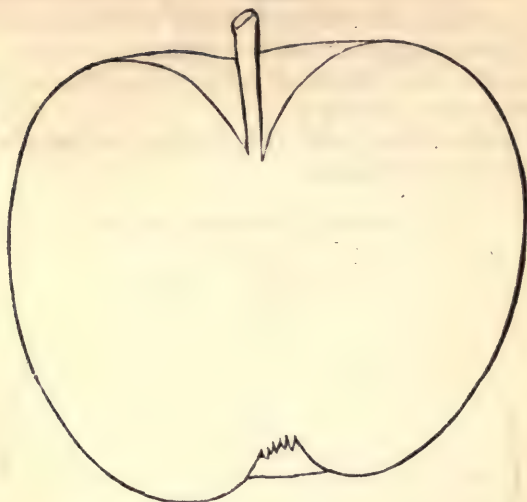
Tree vigorous, of spreading or drooping habit, and, under high culture, very productive.

Fruit medium or below, roundish-conical; clear yellow ground, nearly covered with red of various shades.

Flesh yellowish-white, sometimes pinkish near the surface; juicy, and very tender.

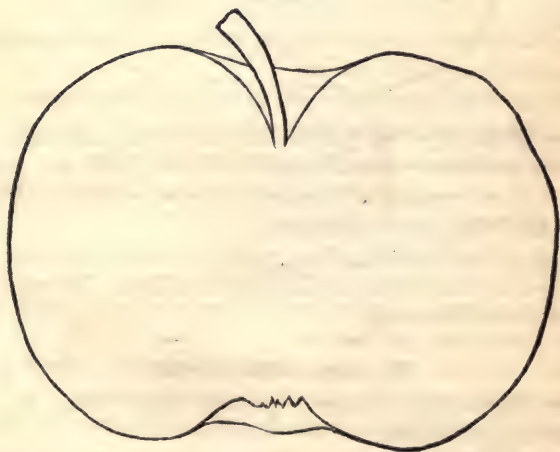
Flavor lively subacid. Ripe from November to February.

Fig. 169.



28. RAMBO.

Fig. 170.



Tree rather upright, of slow growth, but a good bearer.

Fruit medium, round, flattened, nearly cheese form ; greenish-yellow, with some thin russet and a brownish cheek.

Flesh greenish-white, firm, and moderately juicy.

Flavor fine, clear subacid, of considerable richness. Ripens from November to February.

Best south of New York ; it is the popular Seek-no-further of the Philadelphia markets.

29. WESTFIELD SEEK-NO-FURTHER.

Fig. 171.



Tree of fine vigorous growth, and an excellent bearer.

Fruit medium or above, roundish-conical ; dull red over yellowish-green ground, with russet dots or patches ; variable ; occasionally subject to bitter rot.

Flesh yellowish-white, fine-grained, tender, and crisp.

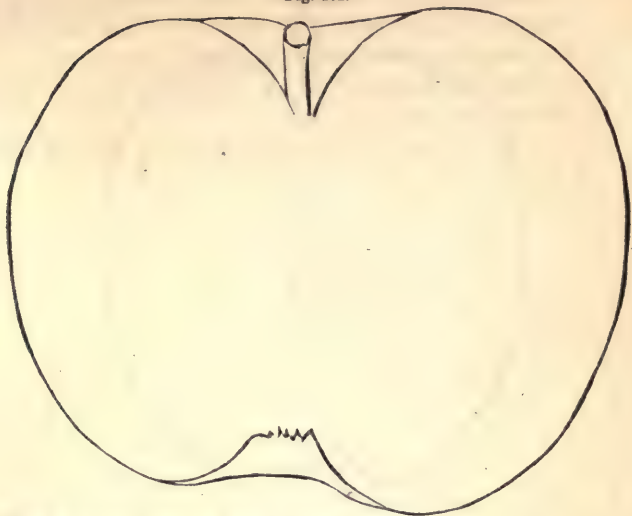
Flavor mild subacid, peculiar and excellent. Ripening from November to February.

30. BROADWELL SWEET.

Tree spreading, of strong growth, with yellowish young shoots ; a good bearer.

Fruit rather large, roundish-conical or flattened ; skin smooth, greenish-yellow, bronzed in the sun.

Fig. 172.



Flesh white, tender, and juicy.

Flavor fine, sweet, and often rich. Ripens from November to February, or later.

This is a new and excellent winter sweet apple, a native of Southern Ohio.

31. AMERICAN GOLDEN RUSSET (*Fig. 173*).

Tree erect and moderately thrifty; young shoots drab color; bears fair and constant crops, and is well suited with high culture.

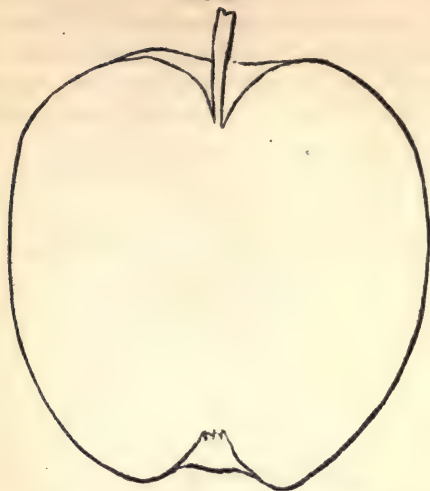
Fruit small, conical or roundish-ovate; dull yellow, covered with thin russet.

Flesh yellowish, very tender and juicy, almost melting when fully ripe.

Flavor mild subacid, with a fine rich spiciness. Ripens from November to February.

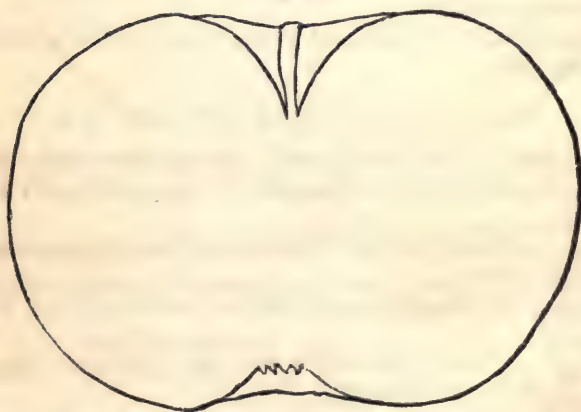
The American Golden Russet is small, but of superior quality, and especially worthy of extensive garden culture. In cold soils and localities it sometimes fails to ripen, and is then inferior.

Fig. 173.



32. WAGENER.

Fig. 174.



Tree of vigorous growth; young shoots green; a regular and fair bearer; will repay care and high culture.

Fruit medium or above, roundish, flattened, and often ribbed

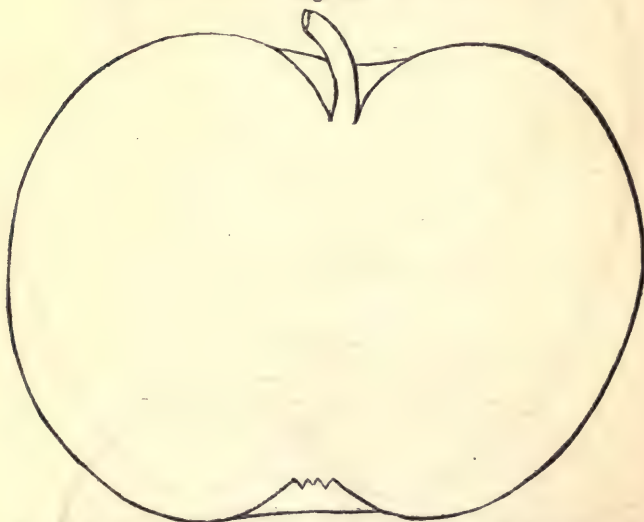
or irregular ; yellow, covered with stripes and shadings of light and dark red, mingled with russet spots or streaks.

Flesh yellowish-white, fine-grained, tender, firm, and juicy.

Flavor subacid, with a vinous sprightliness, and some aroma. Ripens from November to last of February, or later.

33. RHODE ISLAND GREENING.

Fig. 175.



Tree of fine, strong growth, often crooked while young, but forming a fine spreading, symmetrical head ; hardy, and bearing heavy crops of perfect fruit.

Fruit above medium, often large, round, very slightly conical ; skin rough, with spots of semi-russet ; green, becoming dull yellow when perfectly ripe.

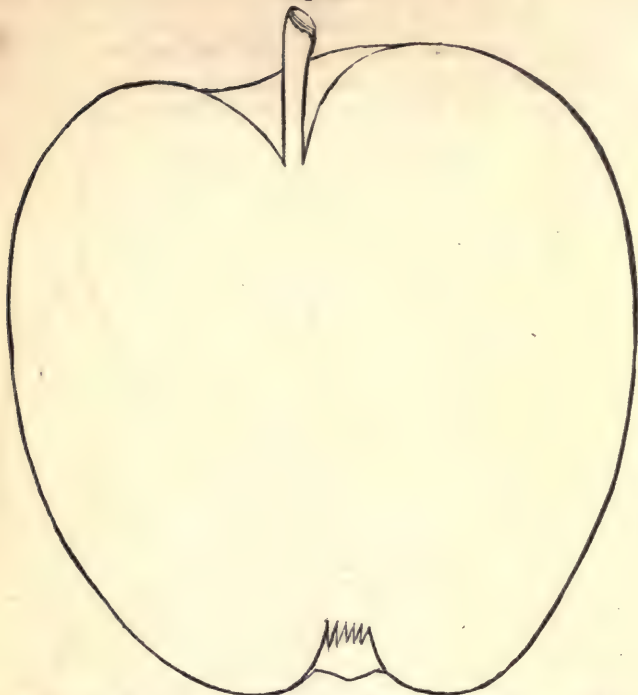
Flesh yellowish, tender, crisp, breaking, and juicy.

Flavor clear, sprightly, rich acid. Ripens from November to March.

34. YELLOW BELLE FLEUR.

Tree thrifty, rather upright, with yellowish young shoots ; a fair bearer, requiring good soil and a rather warm climate.

Fig. 176.



Fruit quite large, long, ovate-conical, irregular; of a lemon-yellow color, with a very slight blush.

Flesh white, fine-grained, tender, and crisp.

Flavor mild, pleasant subacid, with a slight aroma. Ripens from November to March.

35. DANVERS SWEET.

Tree spreading; young shoots yellowish; of rapid growth, and an abundant bearer, especially in rich, strong soils.

Fruit medium, roundish-oblong or conical, smooth; rather deep yellow when ripe, with a shade of blush or orange, slightly specked with russet.

Flesh yellow, sweet, and rich.

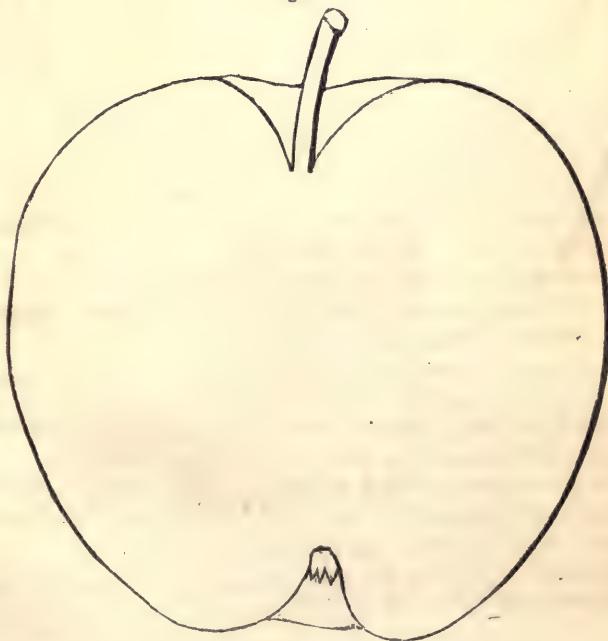
In use from November to March.

Fig. 177.



36. ORTLEY.

Fig. 178.



Tree of vigorous growth, rather upright, with slender young shoots ; in rich soils a great bearer.

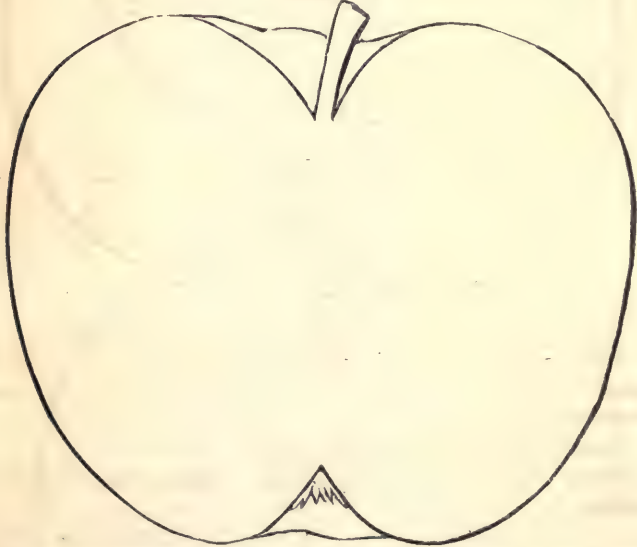
Fruit medium sized to large, oblong or oblong-ovate ; lively yellow, with a bright blush, somewhat speckled with light spots and patches of gray russet.

Flesh yellowish-white, crisp, firm.

Flavor sprightly perfumed subacid. Ripens from November to April.

37. BALDWIN.

Fig. 179.



Tree very vigorous, forming a fine, symmetrical, and heavy head ; bearing abundantly.

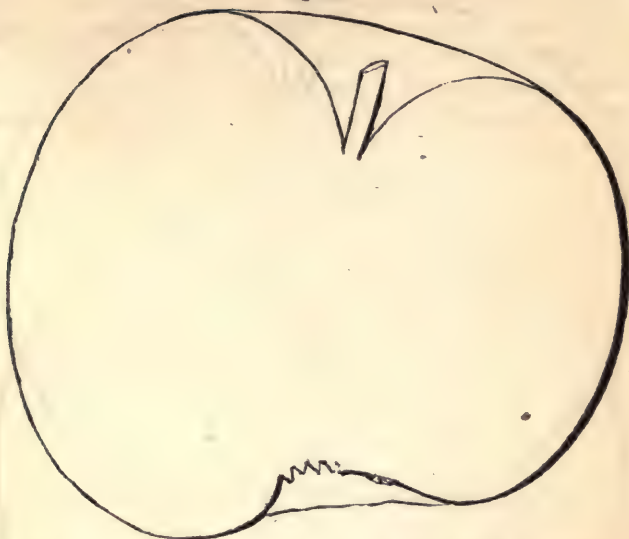
Fruit large, roundish-ovate or conical, narrowing rather rapidly toward the eye, but sometimes slightly flattened ; dull yellow ground, striped and shaded with red of varied depth, with some gray dots.

Flesh yellowish, crisp, not very juicy.

Flavor - a high, rich subacid. Ripens from November to April.

38. WINE APPLE.

Fig. 180.



Tree thrifty, spreading, hardy, and an abundant bearer.

Fruit above medium, round, flattened, irregular or oblique ; bright varied red over yellow, or yellow striped, with some russet near the stem.

Flesh yellowish-white, juicy, crisp.

Flavor rich vinous, slightly acid. Ripens from November to May.

39. SWAAR (*Fig. 181*).

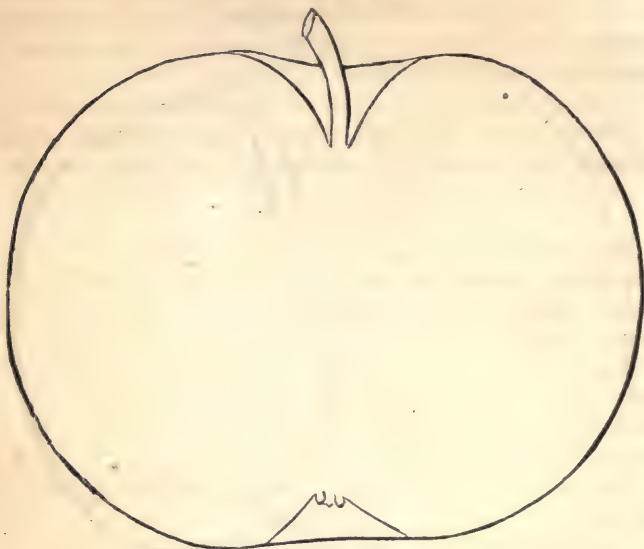
Tree of strong growth, and a fair bearer, succeeding best in a dry, deep loam ; it deserves and will well repay special care and high culture.

Fruit rather large, round, flattened, sometimes irregular ; dead-gold color, with a little russet or darkish spots.

Flesh yellowish, fine-grained, and tender.

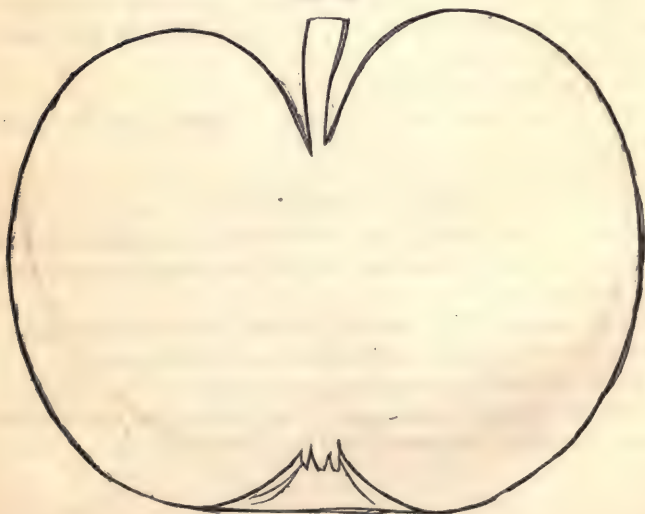
Flavor very rich and aromatic subacid, with considerable spicy fragrance. Ripens from December to March.

Fig. 181.



40. KING OF TOMPKINS COUNTY.

Fig. 182.



Tree spreading, very thrifty, and a good annual bearer.

Fruit large, variable in form, often ribbed, but generally almost globular; yellow, nearly covered with stripes or shadings of red and crimson.

Flesh yellowish, not fine grained, but tender and juicy.

Flavor a very fine rich subacid, with a pleasant aroma. Ripens from November to March. It is a great favorite.

41. LADY APPLE.

Tree erect, vigorous, though not of large growth; its young shoots black; a free bearer when it attains age.

Fruit very small, round, flattened to cheese form; clear light yellow, with bright red cheek, smooth and glossy.

Flesh yellowish-white, firm, tender.

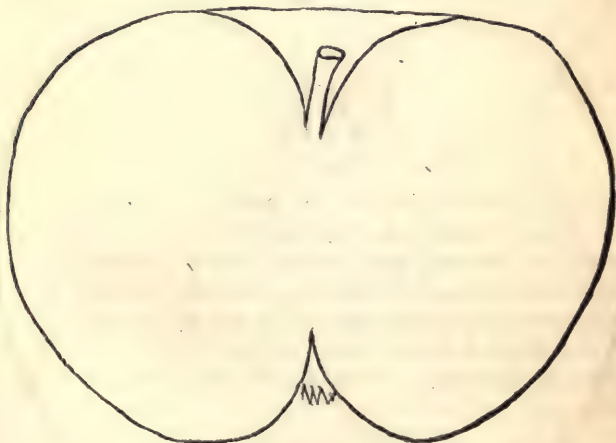
Flavor mild subacid. Ripens from December to March.

Fig. 133.



42. PRYOR'S RED.

Fig. 134.



Tree of strong, free growth, and an abundant bearer.

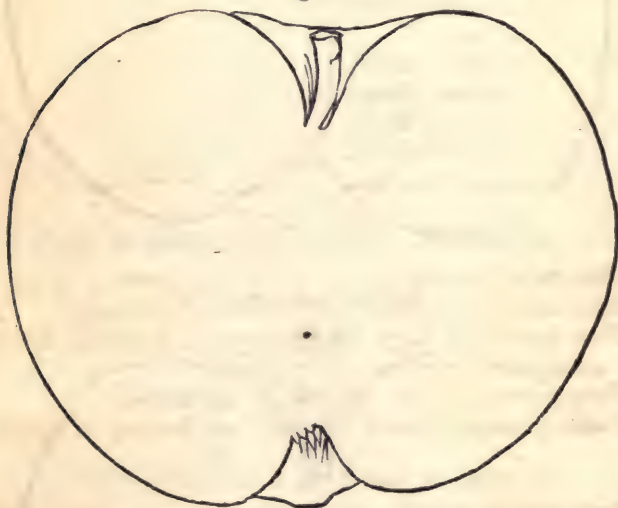
Fruit medium to large, roundish to roundish-conical, irregular, and very variable in form, often becoming angular; greenish-yellow, nearly covered with dull red, and somewhat russeted.

Flesh yellowish, tender, and fine-grained, but not very juicy.

Flavor mild and agreeable subacid. Ripens from December to March, or later.

*43. NORTHERN SPY.

Fig. 185.



Tree of rapid and rather erect growth, with stout, spotted young shoots, making a finely-formed but close head; and, with high culture and age, bearing fair fruit, and freely.

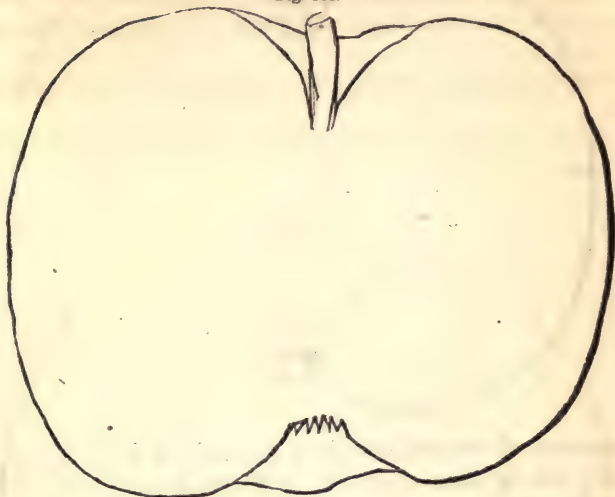
Fruit large, roundish-conical, obscurely ribbed; yellow, nearly covered with streaks of various red or crimson.

Flesh yellowish-white, tender, juicy.

Flavor rich, aromatic subacid. Ripens from December to April.

44. WOOD'S GREENING.

Fig. 186.



Tree rather spreading, and of slender growth; in strong soils or under high culture, a good and uniform bearer.

Fruit medium to large, roundish-conical, somewhat flattened; green, turning yellow as it ripens.

Flesh greenish-white, fine-grained, and tender.

Flavor pleasant subacid. Ripens from January to March.

45. YELLOW NEWTOWN PIPPIN (*Fig. 187*).

Tree of slow growth, with rough bark even while young, but hardy, long-lived, and, in favorable soil and climate, a good bearer; needs and deserves high culture.

Fruit medium to large, irregular, generally round, flattened, and slightly oblique; in fine specimens inclining to oblong; often scabbed and imperfect in unfavorable circumstances.

Flesh yellowish, firm, juicy.

Flavor high, rich, and fragrant, with moderate acid. The finest apple known. Ripens from January to May.

The Green Newtown Pippin is distinguishable only by the

Fig. 187.



appearance of the fruit, which is generally of flatter form, and green, and by some is thought to be rather more juicy, and to keep better.

Both the yellow and the green Newtown Pippin are found of very varied quality in different localities, a result attributable largely, I think, to the existence of seedling sub-varieties.

46. LADIES' SWEETING.

Tree spreading, a little irregular, thrifty, but the young growth rather slender; bears abundantly.

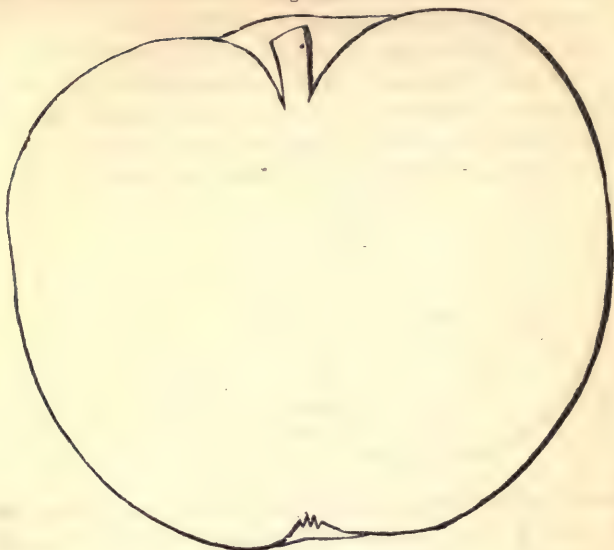
Fruit medium or above, roundish-ovate, sometimes longer; yellowish-green, striped, or having considerable red, covered by a slight bloom; sometimes scarcely distinguishable from the Flushing Spitzenbergh.

Flesh greenish-white, firm, crisp, and juicy.

Flavor rather subacid than sweet, exceedingly pleasant, perfumed, and rich. Ripens from January to May, retaining its freshness to the last.

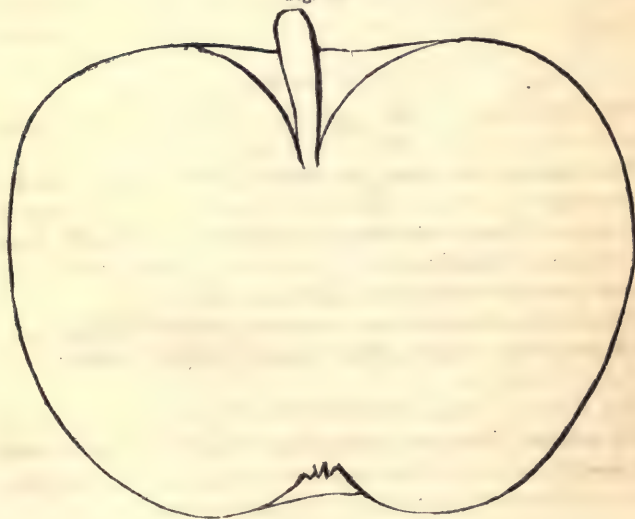
This favorite apple, under various names, has been very widely diffused from its original home upon the Hudson, and well deserves more attention and more special care in its cultivation as a market fruit than it has yet received.

Fig. 188.



47. BAULE'S JANET.

Fig. 189.



Tree of only moderate growth, but an abundant bearer ; blossoming late, and seldom injured by spring frosts.

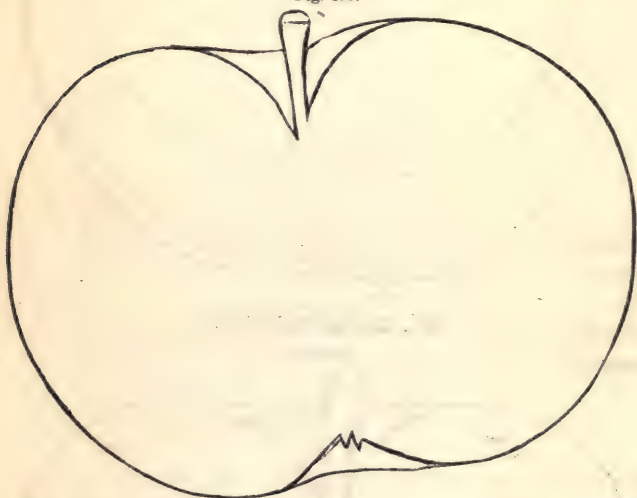
Fruit medium to large ; roundish, flattened at the stem, and often oblique ; skin tough ; light yellow, striped with varying red, according to exposure, with some spots of mould and russet.

Flesh yellowish-white, fine-grained, crisp, and juicy.

Flavor mild, rich subacid. Ripens from January to May.

48. BOSTON RUSSET.

Fig. 190.



Tree strong and spreading, bearing heavy crops of marketable fruit.

Fruit medium to large, roundish, flattened, sometimes slightly angular or ribbed ; dull green russet, becoming brown, occasionally reddish bronzed on the sunny side.

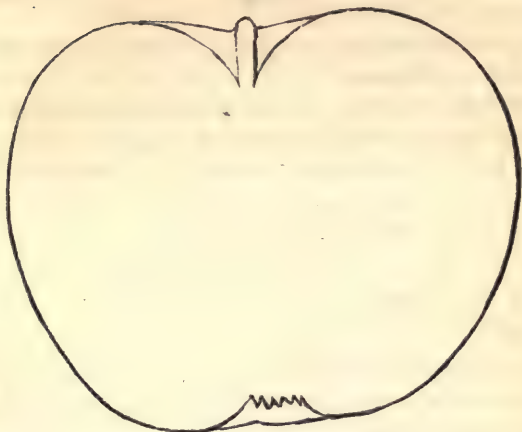
Flesh greenish-white, a little coarse, firm and juicy.

Flavor rich subacid. Ripens from January to July..

49. POUGHKEEPSIE RUSSET.

Tree erect, vigorous ; young shoots reddish-brown ; a heavy bearer.

Fig. 191.



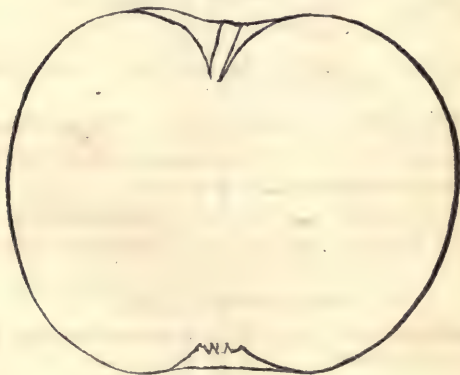
Fruit below medium ; ovate or conical ; pale greenish-yellow, mostly covered with light brown russet.

Flesh yellowish-white, firm, dry.

Flavor rich subacid. Seldom fit for eating out of hand, but excellent when stewed or baked : see page 289. Ripens from January to June or July.

50. TEWKESBURY WINTER BLUSH.

Fig. 192.



Tree of straight and rapid growth, and a free bearer of fair fruit.

Fruit small, rather flat, smooth, yellow, with red cheek and small russet dots.

Flesh yellowish, firm, tender, and somewhat juicy.

Flavor subacid. Ripens from January to August.

This apple is remarkable for its peculiarities rather than its value. It is too small for profitable marketing, and the value it might otherwise derive from its keeping quality is neutralized by the fact that larger and better fruits may be kept till new apples come in, except, possibly, in southern climates.

Lists of Varieties suited to different Sections of Country, numbered in each Class nearly in the order of their beginning to ripen.

FOR THE EASTERN AND NORTHERN STATES.

SUMMER APPLES.

1. Red Astrachan.
2. Early Harvest, or Sour Bough.
3. Sweet Bough.
4. Williams's Favorite.
5. Summer Rose.

FALL APPLES.

1. American Pearmain.
2. Porter.
3. Gravenstein.
4. Fameuse.
5. Mother.

WINTER APPLES.

1. Hubbardston Nonsuch.
2. Minister.
3. Rhode Island Greening.
4. Yellow Belle Fleur.
5. Baldwin.

6. King of Tompkins county.
7. Swaar.
8. Northern Spy.
9. Ladies' Sweeting.
10. Boston Russet.

FOR THE MIDDLE STATES.

SUMMER APPLES.

1. Early Strawberry.
2. Red Astrachan.
3. Early Harvest, or Sour Bough.
4. Sweet Bough.
5. Summer Pippin.

FALL APPLES.

1. Jersey Sweeting.
2. Maiden's Blush.
3. Porter.
4. Gravenstein.
5. Hawley.

WINTER APPLES.

1. Hurlbut.
2. Chandler.
3. Peck's Pleasant.
4. American Golden Russet.
5. Wagener.

6. Rhode Island Greening.
7. Baldwin.
8. Yellow Newtown Pippin.
9. Ladies' Sweeting.
10. Boston Russet.

FOR THE WESTERN STATES.

SUMMER APPLES.

1. Red Astrachan.
2. Early Harvest, or Sour Bough.
3. Early Sweet Bough.
4. Summer Rose.
5. Williams's Favorite.

FALL APPLES.

1. Jersey Sweeting.
2. Porter.
3. Gravenstein.
4. Fall Pippin.
5. Dyer.

WINTER APPLES.

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Jonathan. 2. Rambo. 3. Westfield Seek-no-further. 4. Rhode Island Greening. 5. Yellow Belle Fleur. | <ol style="list-style-type: none"> 6. Danvers Sweet. 7. Ortley. 8. Northern Spy. 9. Boston Russet. 10. Poughkeepsie Russet. |
|---|--|

FOR THE SOUTHERN OR SOUTHWESTERN STATES.

SUMMER APPLES.

1. Early May.
2. Early Strawberry.
3. Early Harvest, or Sour Bough.
4. Early Sweet Bough.
5. Summer Rose.

FALL APPLES.

1. Gloucester Cheese.
2. Maiden's Blush.
3. Porter.
4. Gravenstein.
5. Vandervere.

WINTER APPLES.

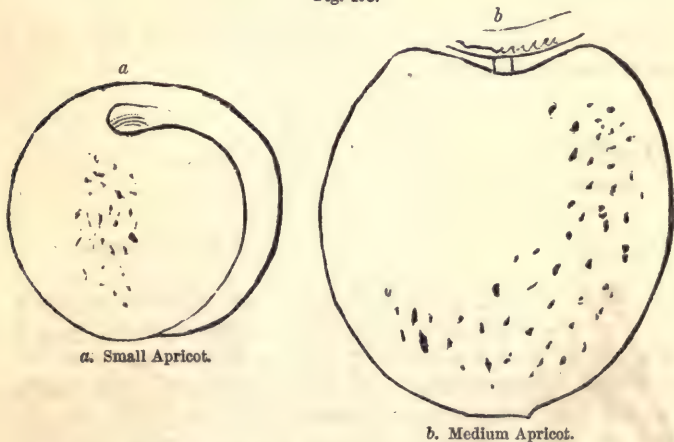
- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Male Carle. 2. Broadwell Sweet. 3. American Golden Russet. 4. Ortley. 5. Wine Apple. | <ol style="list-style-type: none"> 6. Lady Apple. 7. Pryor's Red. 8. Wood's Greening. 9. Raule's Janet. 10. Tewkesbury Winter Blush. |
|---|---|

Perhaps the Poughkeepsie Russet might be advantageously added to each of the above lists of winter apples in which it is not inserted; and for Southern culture Elliott mentions the "Carolina Winter Queen" and the "Nickejack" from North Carolina as apples of superior promise. For the Middle, Northern, and Eastern States, the Donald apple, somewhat known as Watson's Long Keeper, is worthy of careful and extended trial. The tree is erect and vigorous; fruit of a roundish-oblong or conical form, golden yellow, with a bright blush—"painted" cheek, fine-grained and tender, a very mild subacid, yet of peculiar spirit and excellence, whether raw or cooked. In general, the lists given will be found satisfactory, but attention to the remarks on selection of kinds, page 192, will be always important.

THE APRICOT.

The Apricot is one of our earliest and pleasantest fruits for eating out of hand; and though, from its blossoming so immediately upon the opening of spring, it is exposed very often to injury or entire loss by spring frosts, as well as to the attacks of the curculio or plum bug after the fruit sets, yet it merits cultivation, and will repay all the care that in ordinary seasons it requires to carry it safely through the period in which it is liable to be injured. To make this easy, the trees should be kept low and compact by proper pruning; and if there be danger of frost upon the blossoms, set three or four stakes around each tree, and throw over it a large blanket or cloth of any kind, leaving it on in the morning until some time after sunrise.

Fig. 193.



The period of blossoming may also be retarded by keeping the tree shaded so long as frosts are likely to occur; and if, notwithstanding this, they come upon the blossoms, the precautions above mentioned must be taken. Branches of evergreen may be used with good effect both in shading and protection. If the tree is trained against a building it will be still more easy to cover it, but in both cases be careful to se-

cure the covering so that the wind, if prevailing, will not dash it against the blossoms.

Apricots may be planted at the distance of from ten to fifteen feet, the former being sufficient if the trees are well pruned. A pretty rich warm loam suits them best. They may be budded on seedling apricots, plums, or peaches. Either of the two former, however, are to be preferred to the latter, and of them those of free growth. Among plums, a variety of stock known as the pear plum is generally preferred for the apricot.

APRICOTS

Numbered nearly in the order of their ripening.

- | | |
|------------------|--------------|
| 1. Large Early. | 5. Breda. |
| 2. Early Golden. | 6. Peach. |
| 3. Royal. | 7. Moorpark. |
| 4. Hemskirke. | 8. Turkey. |

These are all worthy of attention, but Nos. 1, 4, 6, and 7 are of superior size and quality.

THE BERBERRY.

The Berberry is said to derive its name from the Arabic, connecting us by a very thorny tie to the Berbers of Africa. It is found wild, not only in Africa, but in Europe, Asia, and both North and South America. It is a well-known acid and seedy fruit, sometimes used for preserves, jellies, tarts, and pickles, but too sour for any thing except the last or an acid gargle.

It makes a perfectly impenetrable hedge fence, but its habit of spreading by offshoots renders it objectionable. The bark and wood make a fine yellow dye. The stamens of the common red kind seem to possess a peculiar susceptibility, so that, when touched, they spring over and deposit their pollen upon the stigma of the mature flower. Some new varieties have recently been obtained from India and the Straits of Magellan.

They are raised from seeds, cuttings, layers, or offshoots.

Fig. 194.



THE BLACKBERRY.

NEW ROCHELLE.

The culture of blackberries as a garden fruit is of quite recent origin, dating from the discovery made a few years since, in the neighborhood of New Rochelle, Westchester county, of a fine-fruited wild variety, which, on being cultivated, was found to yield heavy crops of large and well-flavored fruit.

This variety, known as the "New Rochelle blackberry," is the only kind at present in extended cultivation, but probably

Fig. 195.



will not long remain alone.

It is a strong, upright grower, and when planted, as it should always be, in very rich soil, it spreads with great rapidity, and its suckers, if not wanted for plants, should be carefully and persistently destroyed as they appear. It requires treatment precisely similar to the common raspberry (which see), the frame with the sliding bar being peculiarly desirable, on account of its very heavy young growth.

Thorough ripening is essential to the perfection of the fruit, and in this respect cultivators are liable to be deceived by the depth of color which the berry attains before it is fit to gather.

A variety called the "White Blackberry" is occasionally met with in gardens. Its color is really a dirty chocolate, and in respect to flavor and fruiting it is worthless.

Among our wild fruits which have as yet scarcely begun to be regarded as subjects for cultivation, there are some that will probably soon follow the blackberry into the ranks of cultivated small fruits, as the Buffalo-berry of the southwest, *Shepardia argentea*, and the black and blue Huckleberries or Whortleber-

ries, *Vaccinium resinsum* and *tenellum*, and the red-flowering thornless Raspberry, *Rubus odorata*.

THE CHERRY.

In any suitable climate, cherries are among the most easily cultivated of our large-growing fruit-trees. They prefer a rather warm temperature, and around many of the older homesteads of Virginia have grown to an enormous size. Among the numerous fine varieties introduced within the last thirty or fifty years, there is, in their several classes, but little difference that would strike an ordinary observer, except in the time of ripening, and even this is obliterated by bringing them from the opposite limits of one or two degrees of latitude, which can now easily be done in time to place them on the dinner-table still damp with the morning dew. Hence, in our markets, quite a number of different kinds are known by a common name; and, on the other hand, from the rapidity of their recent diffusion, a multitude of synonyms for certain choice kinds are found among nursery-men and amateurs.

Most kinds have an upright and regular habit of growth, which permits of their being planted much closer than would otherwise be advantageous. From twenty to thirty feet will be found a sufficient distance, unless it may be for a few varieties of spreading habit, or in localities where the tree attains a very large size; and, for the same reason, but little pruning is found absolutely necessary. It is quite desirable to form the head of the young tree well at the start—see remarks page 254—and it is often important, in order to facilitate the fruit-gathering, to force a less towering growth by cutting out the strong central leader, even when two or three inches diameter at the point of severance; but this necessity should be prevented by earlier attention in forming the head. Notwithstanding all that may be written, however, a fruit that grows so rapidly, and yields so abundantly, in spite of neglect in its culture, will not be likely to command much care or labor.

Of the sour varieties, which are chiefly used for tarts and preserving or drying, the old-fashioned or Richmond sour, and some of the older varieties of the Morello, are generally decay-

ing, and in many localities are as much injured by the black knot as the plum-tree. The plum-stone Morello is a fine late sour variety, and others will be found in the list below.

The cherry prefers a deep, strong loam, but will thrive in almost any soil, if the climate be favorable. In cold localities, extreme thriftiness in the trees exposes them to the risk of winter-killing or bursting. See p. 260. There are extensive valleys but little north of New York city, along which for many miles the finer varieties of cherry-trees perish at irregular intervals from the severity of the cold. In such localities, or in all more northern latitudes, high manuring must be avoided, and the trees set in positions exposed to the north or north-west, and defended from the winter's southern sun. They may bear the steady cold of a severe winter, but sudden and great fluctuations will almost certainly destroy them.

SELECT LIST OF CHERRIES,

Numbered in each class nearly in the order in which they will be found to ripen in any given soil and latitude. The time of their ripening at New York accompanies the figure and description below..

SWEET FRUITS.

- | | |
|------------------------------------|-----------------------|
| 1. Purple Guigne (<i>Gween</i>). | 7. Holland Bigarreau. |
| 2. Mayduke. | 8. Graffion. |
| 3. Elton. | 9. Black Eagle. |
| 4. Knight's Early Black. | 10. Downton. |
| 5. Black Heart. | 11. Downer's Late. |
| 6. Black Tartarian. | 12. Florence. |

SOUR, OR PIE AND PRESERVE FRUITS.

- | | |
|---------------------|-------------------------|
| 13. Early Richmond. | 15. Plum-stone Morello. |
| 14. Carnation. | 16. Rumsey's Morello. |

1. PURPLE GUIGNE (*Fig. 196*).

Purple Griotte. German Mayduke.

Tree of moderate growth, and spreading.

Fruit rather small, but very early; dark red, purple when dead ripe.

Flesh tender, juicy, and sweet. Ripens last of May.

2. MAYDUKE (*Fig. 197*).*Early Duke.*

Tree of upright growth ; young shoots slender.

Fruit medium size ; bright red, becoming dark red at maturity. A fine acid fruit for pies while still unripe, but of a rich subacid flavor when fully matured.

Ripening last of May and first half of June ; often having green fruit upon certain branches when the main crop has matured.

Fig. 196.

Fig. 197.

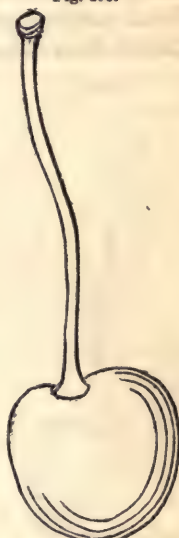
Fig. 198.



Purple Guigne.



Mayduke.



Elton.

3. ELTON (*Fig. 198*).

Tree vigorous, spreading.

Fruit pretty large, slightly pointed ; pale yellow, with a bright red, mottled cheek.

Flesh rather firm, but juicy, rich, and excellent.

Ripens about the middle of June, immediately after the Mayduke.

4. KNIGHT'S EARLY BLACK (*Fig. 199*).

Tree of moderate vigor, spreading.

Fruit rather large, irregular, dark purple.

Flesh purple, tender, juicy, and fine-flavored.

Ripens about the middle of June.

5. BLACK HEART (*Fig. 200*).

Early Black. Black Russian.

Tree vigorous, erect.

Fruit of medium size, uneven in outline ; dark purple.

Flesh purple, tender, juicy, and sweet.

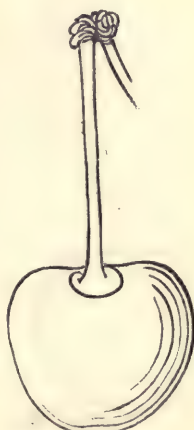
Ripens from the middle to the last of June.

Fig. 199.



Knight's Early Black.

Fig. 200.



Black Heart.

Fig. 201.



Black Tartarian.

6. BLACK TARTARIAN (*Fig. 201*).

Dyckman's. Bishop's Large. Ronald's Black Heart.

Tree extremely vigorous, erect.

Fruit very large, irregular, almost oblong ; nearly black.

Flesh purplish, tolerably tender, juicy, rich, and delicious.

Ripens from the middle to the last of June.

7. HOLLAND BIGARREAU (*Fig. 202*).*Armstrong's Bigarreau. Spotted Bigarreau.*

Tree of strong and spreading growth.

Fruit large, regular; pale yellow, shaded and spotted with bright red on the sunny side.

Flesh firm, juicy, and excellent.

Ripens toward the last of June.

Fig. 202.



Holland Bigarreau.

Fig. 203.



Graffion.

8. GRAFFION (*Fig. 203*).*Bigarreau. White Bigarreau. Yellow Spanish.*

Tree of vigorous but diverging growth, forming a fine spreading head.

Fruit large; pale yellow or amber, with clear red on the sunny side.

Flesh light yellow, very firm, but of fine, rich flavor when ripe.

Ripens about the last of June.

9. BLACK EAGLE (*Fig. 204*).

Tree vigorous, spreading ; young shoots quite stout.

Fruit medium or above ; deep purple or black.

Flesh purple, tender, juicy, and rich.

Ripens beginning of July. .

10. DOWNTON (*Fig. 205*).

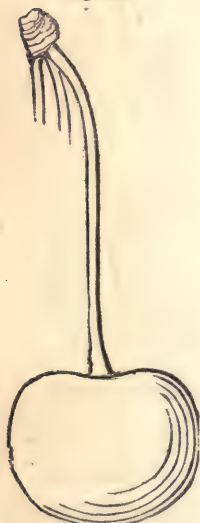
Tree of moderate growth, making a round head.

Fruit large, roundish, regular ; creamy, and very clear ; stained and dotted with red on the sunny side.

Flesh light yellow, tender, fine, and rich.

Ripens early in July.

Fig. 204.



Black Eagle.

Fig. 205.



Downton.

Fig. 206.



Downer's Late.

11. DOWNER'S LATE (*Fig. 206*).

Tree of moderate vigor, somewhat spreading.

Fruit medium or below ; light clear red, veined with amber.

Flesh tender, sweet, and excellent. Ripens early in July.

12. FLORENCE (*Fig. 207*).*Knevet's Late Bigarreau. Dyckman's Late.*

Tree of strong growth and fine spreading habit.

Fruit large, roundish, slightly inclining to reniform; amber-yellow, marbled with red, and the fully-exposed fruit becoming flushed with red on the sunny side.

Flesh yellowish, very firm, but juicy, sweet, and superior.

Ripens about the middle of July.

Fig. 207.



Florence.

Fig. 208.



Early Richmond.

SOUR CHERRIES, PIE AND PRESERVE FRUITS.

13. EARLY RICHMOND (*Fig. 208*).*Virginian May. Kentish.*

Tree of low habit, with regular spreading head; young growth slender.

Fruit medium or below, round; bright red, becoming rather dark at maturity.

Flesh tender, melting, juicy, and of a fine acid flavor: first-rate for culinary purposes.

Ripens in all June.

14. CARNATION (*Fig. 209*).*Wax Cherry.*

Tree of strong growth and spreading habit.

Fruit large, round ; clear light red.

Flesh pretty firm, juicy, and acid, becoming almost subacid at maturity.

Ripens from the middle to the end of July.

15. PLUM-STONE MORELLO (*Fig. 210*).

Tree thrifty, spreading ; young shoots slender.

Fruit rather large, roundish, heart-shaped ; deep red.

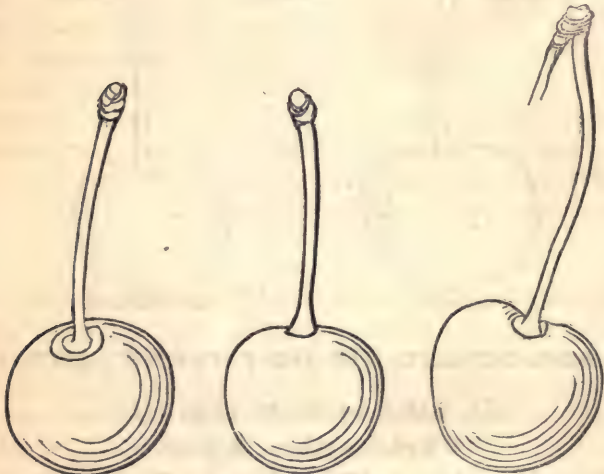
Flesh reddish, tender, and juicy ; of a fine acid flavor.

Ripens last of July.

Fig. 209.

Fig. 210.

Fig. 211.



Carnation.

Plum-stone Morello.

Rumsey's Morello.

16. RUMSEY'S MORELLO (*Fig. 211*).

Tree of slender and slow growth, and spreading habit.

Fruit above medium, having a suture on one side ; smooth and regular ; color a clear bright red.

Flesh tender, juicy, and melting, but quite acid.

Ripens in August, and later.

THE CRANBERRY.

Cranberries may be raised on any moist land by covering

Fig. 212.



the space to be planted with a thick coat of swamp muck, and setting the plants in it at a foot or eighteen inches apart, according to their strength. Keep them perfectly clean until they obtain possession; they will then take care of themselves, keeping out all other growth, and yielding their fruit abundantly, which is usually gathered with a peculiar box-rake, known as the cranberry-rake. Top-dressing with well-rotted compost after the crop is gathered improves

both the quantity and quality of succeeding crops. It is said that they can also be well raised on dry soils, but probably would require increased labor, with smaller return for it, their natural home being moist bog meadows.

CURRANTS.

Of varieties there are the Black Naples, the Red and the White Dutch, or common, and certain other inferior varieties or mixtures of these, and still others larger fruiting and later, but more acid and less worthy of cultivation. The recently-introduced cherry currant is produced somewhat after the manner of the Black Naples, bearing its large fruit upon short bunches; the seeds are rather large, and the quality of the fruit only fair, but it is a showy, and, on the whole, a desirable variety.

Though one of the most valuable of our small summer fruits, if not, indeed, more useful than any other, currants are scarcely subjects of *cultivation*; for this implies more than merely planting in a corner or by a fence, and gathering the product

when it comes. Yet they will well repay by the abundance, and excellence, and beauty of their fruit, the little labor their cultivation requires.

Fig. 213.



a. Black Naples.



b. Red Dutch.



c. White Dutch.

They may be set out at four or five feet apart, and either kept to a single stem, or to two or three. Satisfactory results will be obtained if the bushes are kept clear of grass and weeds, the offshoots from the collar of the root suppressed, the head of the bush kept rather open than otherwise by thinning out any excess of bearing shoots, and compact in form by shortening the young wood, according to its strength, to from one half to one third of its last year's growth in the winter pruning as directed for gooseberries, p. 346.

Currants may be planted in almost any soil or situation, and

are as easily raised as willows, from layers, or cuttings planted in the fall or early spring. There are many sub-varieties, with considerable differences in the quality and pleasantness of their acid, and it is worthy of care that your young plants be raised from such as are most agreeable to your taste.

The season of this fruit may be prolonged by planting some in warm spots, or light soil, and others in the shade, or on a north slope, or in cold soil, or by covering single bushes with mats closely wrapped and fastened around them before they are quite half ripe, uncovering them to the sun a few days before they are to be gathered for use, to sweeten them, as currants ripened in the shade are somewhat acid, though by no means so sour as when left to become over-ripened upon leafless branches in the sun.

The Black Naples currant makes a conserve or jelly that is very useful in domestic practice for removing soreness of the throat, for preparing a cooling drink in fever by stirring it into water, or for the easy administration of medicines to children. The red and white, either separately or mixed, stripped and sugared, are an ornament and a delicacy upon the tea-table; and the perfectly free use of *the ripe, fresh-gathered fruit* in this form, or directly from the bushes, is, in general, a complete preventive of summer complaint and tendency to dysentery in children or adults.

•THE FIG.

Wherever the climate favors their production, figs are among the most easily cultivated of fruits, the natural growth of the tree being such as to render pruning almost entirely unnecessary, and one or two crops a year being yielded with certainty. In latitudes north of 40° they require protection, but in warm situations, in cities, against a wall, or in a recess by a house or other building, or even in some open situations, a pretty thick coating with straw and matting, or laying down the whole tree and banking earth over it, will be found to answer this purpose, and one small crop per year can be obtained.

The ripe, undried fruit, however, is very luscious, with a

Fig. 214.



little faintness of flavor, which renders it less desirable than it might otherwise be, so that its culture, where it can not be profitably dried for market, is a matter of mere fancy, except for persons of peculiar taste. Unlike other fruits, the fig is not produced from any apparent blossom, but is borne, generally singly, upon the young branches, the flower being included in and forming part of the fruit.

The filaments which constitute the flower, or, more properly, the floral organs, are readily seen in the fresh-gathered fruit, and sometimes also in the thick-skinned, imperfectly-ripened, dried figs of commerce.

It is said that in certain districts of France the fruit is sometimes anointed in the eye with sweet oil, when near maturity, to secure its ripening, and Downing seems to think the operation effective to this end; but in the absence of any apparent connection, we doubt if they are cause and effect. Where practiced, it is probably an old custom, of which the origin has been forgotten and a new account of it invented.

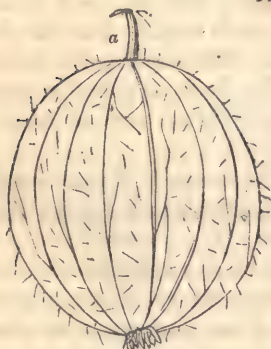
The fig-tree is easily raised from offshoots, layers, or cuttings, and will grow in almost any soil. The choicer varieties are the Brunswick, or Black Naples; the Brown Turkey, or Naples; the Black Ischia, the Black Genoa, the Malta, the White Marseilles, the Nerii, and the White Ischia.

The Egyptian fig, or sycamore fruit of the Bible, sometimes also called "Pharaoh's Fig," and, from its leaf, "Mulberry Fig," is not, in strictness, a fruit, but a seedless excrescence which forms upon the trunk and large limbs of a wild lowland tree of the East. It is either thrown out naturally by the tree,

or produced by the action of insects, or by wounding the bark for the purpose. It resembles a fig, but is of extreme bitterness until opened by the nail or some sharp instrument, so that a portion of its milky juice exudes, when it ripens and becomes of a dull sweet, but luscious and not very wholesome. The tree yields it abundantly and constantly, in Jewish parlance "bearing seven times a year." This excoriation of the bark and opening of the "fruit" seems to have been the employment of the prophet (Amos, vii., 14), who was a gatherer, or, rather, a "dresser" or "scraper" of sycamore fruit.

THE GOOSEBERRY.

Fig. 215.



a. Crown Bob.



b. Whitesmith.



c. Houghton's Seedling.

Almost every variety of gooseberry cultivated among us is of European origin, and generally, in our climate, subject to a mould or mildew upon the fruit, that destroys the crop. It is true, this may be measurably, and in some seasons entirely avoided by careful winter pruning, moderate shade by planting them

near grape-vines or peach-trees, &c., and high manuring with compost from year to year, and sowing lime, sulphur, or ashes over them repeatedly when in blossom and young fruit ; but it is scarcely probable that the cultivation of gooseberries can become general among us, unless, either from those now in reputation or from some of our own wild ones, new seedling varieties, exempt from the disease, may be produced. The English have a fancy for raising them of monstrous size for exhibition, leaving on the bush only a few berries, and supporting these so that they do not hang, but rest and fatten. The berry, when ripe, is of a very mild, yet lively and pleasant acid, or rather vinous flavor, the very large kinds never being in this respect equal to the smaller. While green, they are used for tarts, &c., having a very strong, rough acid, a part of which should be leached off by scalding the fruit before it is used, and pouring off the water when cooled. But for these purposes the pie-plant affords a better acid, and is much more easily raised and handled.

Gooseberry bushes should stand in rows from four to six feet apart each way, and be kept on one stem, with but few bearing shoots, and all offshoots suppressed. Every winter, with a light pair of pruning shears, shorten the last season's shoots, cutting the strong ones to about half their length, those of medium growth to about one fourth, and those that are weak close to the point from which they started ; and keep the bushes regularly and thoroughly manured. The plants are readily raised from layers or cuttings. See pages 197 and 198.

The kinds named in the nursery catalogues are very numerous, but among the red hairy varieties, that known as "Crown Bob" bears the highest character, and "Whitesmith" among the smooth-skinned green or yellow kinds. Houghton's Seedling is the only American variety of reputation, and is exempt from mildew.

Rough or hairy gooseberries are more uniformly well flavored than the smooth varieties, and I incline to think the red ones generally better than the green or yellow, yet the finest flavored known variety is a grass-green hairy berry, so small as to be profitless.

THE GRAPE.

Of native grapes, the Isabella (Fig. 216 *a*), Catawba, Diana, Concord, Rebecca, and a few others, succeed well near New York, and some of them far to the north of it. The Bland, Elsinburgh, and Ohio, or Cigar-box, and several others of merit, require a more southern latitude.

Of foreign grapes, the red Muscat and white Muscat of Alexandria (Fig. 216 *b*), for heated graperies, and the black Hamburg and white Muscadine for house culture, either with or without fire-heat, will be found valuable.

Fig. 216.

*a.* Isabella Grape.*b.* White Muscat of Alexandria.

The grape, like the cherry and currant, often yields its fruit so abundantly, in spite of neglect, that in multiplied instances it is not in any sense cultivated; it simply grows. When planted merely with a view to shade or ornament, this is well, but the *culture* of the grape is usually entered upon in expectation of a profitable return, or, at least, of combining this with other gratifications.

European grapes are almost entirely excluded from our consideration by their uniform failure in out-door culture in our climate, and their exposure to mildew and failure, even in house culture, unless incessant care and labor are bestowed upon them.

Our choice of kinds is therefore very limited, and any one may easily obtain and test for himself, at small expense, all the varieties that at present pretend to claim attention. Most of our varieties are of wild natural origin, some of which, nevertheless, compare favorably with many of the cultivated European kinds. Starting in the culture of this fruit with such originals, we may fairly expect that intelligent and persevering cultivation, to the force of which no plant yields itself more readily, will rapidly supply new and superior varieties suited to our varied climate, and surpassing rivalry.

The grape will do well in almost any soil. It grows wild alike upon our dryest lands and in our swamps, from the Penobscot to the Rio Grande. For its most successful cultivation, however, a deep, dry, limestone soil or sandy loam is desirable.

Wild vines or worthless ones may be successfully cleft grafted, after the vines have leaved out, with grafts kept for the purpose from the winter pruning; these should be buried or cellared until wanted for use. Cut off the stock and insert the graft a few inches under ground; if possible, wrap it in the ordinary manner, earth it well up, and set a stake to it.

The young plants may be raised by cuttings, as directed pages 196, 197, or by layers. If the shoots of the previous year are layered early in the spring, they may be set out the next year, but if shoots of the current season be layered in June or July, they should be severed from the parent vine and cut back in fall or the next spring, but ought not to be removed for setting out until the following year, their roots being too tender.

Two-year-old plants raised from cuttings, or layers raised as above directed, just taken from the parent vine, and cut back to one or two buds, may be set out in the ordinary mode of tree-planting—see page 245—in large holes with loosened bottom, dug at least eighteen inches deep, and filled up with good rich mould to twelve or fifteen inches, according to the size of the root. Let rich earth or perfectly rotted compost be mixed with the soil, or used exclusively in filling up. Tread the earth lightly upon and around the roots, and suffer only one or at most two buds to start. In removing old vines, cut them clean down

before replanting; they will recover vigor much sooner than if you leave the old growth upon them.

The vine is a greedy feeder, and its absorbents act with great rapidity, so that in vine regions over-manuring is found to weaken the juice and spoil the character of the wine, and is sometimes forbidden by law on this account. An inopportune application of foul manure is also apt to taint the fruit. Good compost, having in it a mixture of bones, charcoal, and animal matter, applied at the planting of the vines, and annually dug in around them, with summer top-dressings of leached or unleached ashes, guano, or bone-dust, and attention to keeping them free from weeds, with occasional additions of fresh surface earth, which may be half-rotted sod pared thick from a loamy road side and chopped up, or any good surface loam, will ordinarily insure healthy vines and heavy crops.

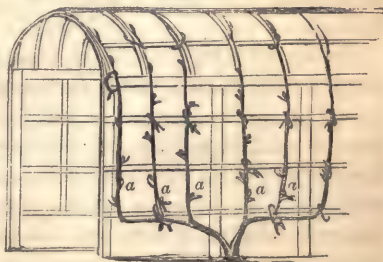
Vines are arranged for cultivation upon arbors, trellises, or stakes, and may be treated either upon the "spur" or "alternating" system, though in general cultivators do not rigidly adhere to either, but pursue a mixed course, according to individual fancy or knowledge, and the particular state of the vines from year to year. Their training may either be upright or horizontal, but, if otherwise suitable, the latter is to be preferred; or any fancy winding, ornamental fashion may be adopted with advantage.

ARBOR.

Fig. 217.

The vine as it appears in the spring before it starts, upon the spur system.

a. The permanent main canes, with their spurs, and the buds from which the fruit for the season is expected to proceed.



Whether for arbor or trellis culture, the vines may be set from ten to twenty feet apart, at discretion.

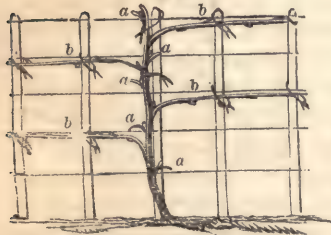
SPUR SYSTEM.

In the spur system one or more shoots are permitted to extend themselves gradually from each plant, being cut back at the first winter pruning after the setting out to three or four buds, at the second to six or eight, or more, increasing the length of these main canes from year to year, according to their strength, permitting only a limited quantity of fruit to be borne upon the spurs or side shoots from them until these main ones have attained the length at which it is intended permanently to keep them (see Fig. 217). After this, all the spurs or side shoots are annually cut off at the winter pruning to within a single bud, or close to the old stem or main cane from which they issue. Each joint upon these main stems or canes becomes by the annual repetition of this process a bunch of undeveloped buds, from which young shoots are annually put forth, upon which the season's crop of fruit is borne. These are kept in check during summer by nipping, and removed entirely at the winter pruning, as described below.

The main canes of the vine in the figure are trained upright, but they may also be trained horizontally by carrying the main stem originally to the top of the arbor, and forming the main canes from its side buds, or the mode may be subsequently changed by cutting away all but one or two of the main canes, making them stems, and furnishing the horizontal canes from their spur buds.

TRELLIS.

Fig. 213.



The vine upon the trellis, winter pruned and arranged upon the alternating system; as it appears before it starts in the spring.

a, a, a, a, a. Five canes cut back, leaving a single bud on each, close to the main stem, to form the growth-canec of the current season and the fruit canec of the next.

b, b, b, b. Four canes shortened to the dimensions of the trellis to bear the current season's crop of fruit, and be cut back in the manner of *a* at the coming winter pruning, and form next year's growth-canec.

The trellis is the arbor sides without its arch, a simple up-

right frame of posts with bars or slats, these latter running lengthwise, at about a foot apart. Its general direction should, if convenient, be north and south.

STAKES.

Fig. 219.



The vine upon stakes as seen in spring before starting; on the alternating system.

a, a. Two canes cut back for growth.

b. A young bud near the main stem to form a third cane for next season.

c, c. Young canes shortened for the season's crop, to be cut out in the next winter's pruning.

Foreign grape-vines, with short joints and comparatively moderate growth, may be cultivated, where other circumstances favor, upon a single stake, by either system of pruning; but the extraordinary vigor of American grape-vines renders three stakes expedient, if not absolutely necessary; these form really a small trellis, and this may be adopted as a preliminary mode for vines which are intended to form permanent trellises or arbors, or other stakes may be added as the extending growth of the canes may demand.

ALTERNATING SYSTEM.

This system, which is quite superior to the former, consists in allowing only a limited number of young canes to grow in each year, proportioning them, both in number and length, to the strength and support of the vine root, and cutting out at every winter pruning all canes that have previously borne fruit. Thus, if the plant has two canes, each of which in the winter pruning you have shortened to four feet, then you will permit only two new ones to grow the current season (Fig. 219). To these four canes, two bearing and two growing, the usual care is to be given through the summer and fall, as hereafter directed. In the winter pruning the two bearing canes are cut entirely out to a single bud, and you have again two shoots

for the next season's fruit, Fig. 219 *c, c*, and two buds to form growth, Fig. 219 *a, a*. If your vine has strengthened sufficiently, the bearing canes may be left six feet long or more, and a third growth-cane be provided for from a strong bud near or on the main stem, Fig. 219 *b*.

This simple process, by which the finest fruit is uniformly produced, goes on from year to year without change, except that, as the root of your vine increases in strength, you either increase the number of the shoots you permit to grow, or add to their length, or both.

The only rule in the case is to proportion the fruit canes you leave to the capacity of the root, in view of its strength, and the extent and richness of the space from which its supplies are to be drawn, taking care to have at least an equal number of growth-caness in preparation to succeed them in bearing fruit the following year.

In many old vineyards of France and Germany the vines are planted but from four to eight feet apart, and are never suffered to grow more than a few feet high, while in other circumstances a single vine may cover a vast area, and bear annually hundreds of pounds of fruit. In general, it will be found better, if otherwise suitable, to limit the number of bearing canes and increase their length, not only on account of the easier tending and beauty of display which it permits, but also because the finer fruit is commonly produced from canes of superior strength.

SUMMER PRUNING.

The summer pruning of the grape-vine should be begun at the first appearance of the young leaf, all the pushing buds that are not wanted being carefully broken off, permitting only a single shoot to grow from each joint. Just before the blossoms open, remove all bunches that are small and weak, or in excess, proportioning in the process the probable quantity of fruit to the strength of the particular cane on which it is to be borne, and the total quantity to the strength of the vine. Suppress all weak, or irregular, or superfluous after-growth, whether from the stem or main canes of the vine, limiting ab-

solutely the number and direction of the shoots permitted to grow to the pattern you propose to follow, and whether on arbors, trellises, or stakes, confine each vine definitely to a given space, and do not suffer it to run beyond it, but persistently stop it at its boundary-line by nipping.

These things being done, the summer pruning of vines cultivated upon the spur system, in which there is but one class of growth, Fig. 217, becomes perfectly simple. The whole proper young growth of the season must be shortened by nipping each shoot at from three to five joints beyond the outermost bunch of fruit upon it, thus checking growth, yet leaving sufficient foliage to fully elaborate the sap and preserve health in the vine and fruit.

In the alternating system of cultivation there are two classes of growth to be cared for, the bearing and non-bearing; the bearing canes, Fig. 218 *b, b*, should be treated precisely as just described for the spur system; checking the young growth of the season by careful but not excessive shortening, in order to force the energies of the vine plant into the direction of fruitage instead of mere growth.

The non-bearing or growth-can^{es}, starting from the buds *a, a, a, a*, Fig. 218, must be laid carefully to their course and tied securely. All side shoots thrown out from them must be nipped, not close to the joint from which they proceed, as this would be likely to force growth from the main bud of that joint, which lies dormant at the base of the side shoot, and upon the quiescence and strength of which your next year's fruit depends, but nip them while quite tender at one or two joints' distance from the main shoot, leaving them as spurs upon it; and when a second growth is put forth from the extreme bud left, nip this again as often as may be needful; and just as the shortening of the whole growth in the bearing canes concentrates the force of the vine in the fruit, so the shortening of the side growth upon non-bearing canes concentrates it in the principal shoots, ripening their wood, enlarging and strengthening their buds, and preparing them for yielding a full crop of fruit in their season. It only remains to limit the length of growth in these main non-bearing canes to

their prescribed boundaries, whether allowing five feet or twenty, nipping and renipping their extremities as may be required to effect the object.

In doing this, leave at least one or two extra joints, to be cut from the end in the winter pruning; and if the canes are desired to make cuttings, omit nipping the extremities of the main shoots entirely until two or three weeks before the growth ceases in the fall, which will afford time for perfectly maturing the cane throughout its length.

Faithful summer pruning will be found not only essential to the perfection of the growing crop, but largely conducive to the amount and character of the next year's product; it should, however, be done regularly, and not neglected until its performance becomes analogous to the French practice of stripping off the leaves for fodder. American vines will not bear this; fullness of foliage is essential to their vigorous health; and, unless the leaves are so massed as to exclude air, the fruit will ripen fairer and sweeter in their shade.

WINTER PRUNING.

The winter pruning of grape-vines in both systems is performed, as already shown, by cutting out to a single bud all the bearing canes of the preceding summer, cutting also clean away all the side shoots or summer spurs of the new canes, and shortening these to their proper length for producing the coming crop, according to the bearing capacity of your vine. This winter pruning may be properly performed at any convenient time from the fall of the leaf to at least a month before the actual opening of spring; but the best time to do it is immediately on the dropping of the foliage, chopping up all trimmings not required for cuttings, and burying them with the fallen leaves around the vines from which they came. The green summer trimmings throughout the season should also be either buried or strewn beneath the vines to decay, and not be carried off.

The cuttings also may be made and planted before winter, as directed page 197; or, if desired, the canes for cuttings may be buried a few inches deep until spring.

GRAPE-HOUSE.

If a proper grapery is desired, its construction and manage-

Fig. 220.



ment may be learned from any of the numerous elaborate treatises upon grape culture. But any one may construct a cheap cold grapery, as shown in the figure, in which foreign grapes, or the more tender of our

own native kinds may be produced.

For this purpose, choose a spot facing as near south as possible; if against a building or a bank wall, so much the better. Trench the spot so chosen, and ten feet beyond where the front of your house will come, to a depth of two feet or more, enriching it as you proceed with the various manures named p. 349. If the subsoil is at all moist, throw into the bottom of each trench, as you make it, loose stones, brick-bats, lime rubbish, old boots and shoes, brush, &c., &c.

When this is finished and the ground settled, lay out your house twelve feet wide, with the front two to four feet high and the back twelve. Having set posts for the whole, board all tight on both sides of the posts, as is usual in constructing ice-houses, leaving only an end door-way, and small openings for ventilators along just below the front and back plates, to be closed either with hinged or sliding wooden or glass doors. As you proceed with the boarding, fill in all between the posts with sawdust, or dry tan, or swamp hay, or straw and charcoal dust, or dried peat, or swamp-muck, pretty well packed down.

Having all smooth and ready, lay on your plates and arrange the rafters, which will be something over fifteen feet long, and may be three feet apart in the clear. This will require sashes three feet wide, each having five rows of six-inch glass, or six rows of five-inch. These sashes will rest, and may either be fixed, or slide upon cleats nailed against the rafters, the front plate being beveled so that the lower sashes will slide from their cleats evenly over it, if desired.

For the upper sashes, nail the cleats so as to bring the upper surface of the sash frames flush with the upper edge of the rafters, while the lower end of each rests upon the back rail of the lower sash, fitting closely, but so that it will slide over it when it is desired to open the upper part of the house. These sashes may be about six feet long, or the house may be made sixteen feet wide, requiring rafters about nineteen, and sashes seven feet or more long, and the small remaining portion of the roof may be shingled or tightly boarded over, packing it as the other boarded parts, if it is convenient. The frames of such sashes, made of inch and a half or two-inch stuff, will cost, without glass or painting, about one dollar each, and each sash will hold from fifteen to eighteen feet of glass, which any boy may put in. If you have no protection from bank wall or building, you may, if convenient, add a small narrow shed along the back, as shown in the figure.

Having your grape-house thus prepared, plant a vine under each rafter ten or twelve inches inside the front, and another, if you choose, immediately opposite, near the back.

By either the spur or alternating system of pruning, as described for out-door culture, you gradually lead them up and along just below the rafters until they meet. They require careful summer pruning. Nip each bearing cane within two or three buds of the fruit, and the small side shoots of the new non-bearing canes uniformly to within *one bud* distance from the cane, and repeat this nipping upon any second growth that may occur. See page 353. They also need frequent waterings, at least once a week, extending over the whole border, for which soap-suds may be used. In bright weather, except while blossoming, they should be syringed with tepid water three or four times a week until the grapes are full grown, when watering and syringing should *gradually* cease.

If the fruit is likely to crowd on the bunches, and there be a fancy for peculiarly handsome bunches and fine berries, the smaller berries may be thinned out with the grape scissors. See Fig. 92 e, page 209. With this view, also, the number of blossom bunches left at first may be specially limited. By these combined means, under favorable circumstances, the fruit

will be much increased in size and improved in quality. If the mildew occurs, scatter sulphur upon them immediately; and if the aphid attacks them, shut the house up, and either with a furnace or patent fumigator smoke it thoroughly with tobacco, following this with heavy syringing. From first to last, give them gradually, never suddenly, all the air you possibly can, consistent with their protection from cold and sudden changes.

Careful pruning, plenty of air, and a temperature equable, but rising with the advancing season, with syringing and watering, the artificial substitutes for dews and rains, complete the circle of requisites in the treatment of a cold grapery.

In November the vines may be taken down and pruned for spring, and being laid along upon the border, front and back, must be covered with leaves, or mats, or straw, to preserve them from frost through the winter. In March they should be taken out and put up as before, first being carefully washed throughout with soap-suds and a soft brush.

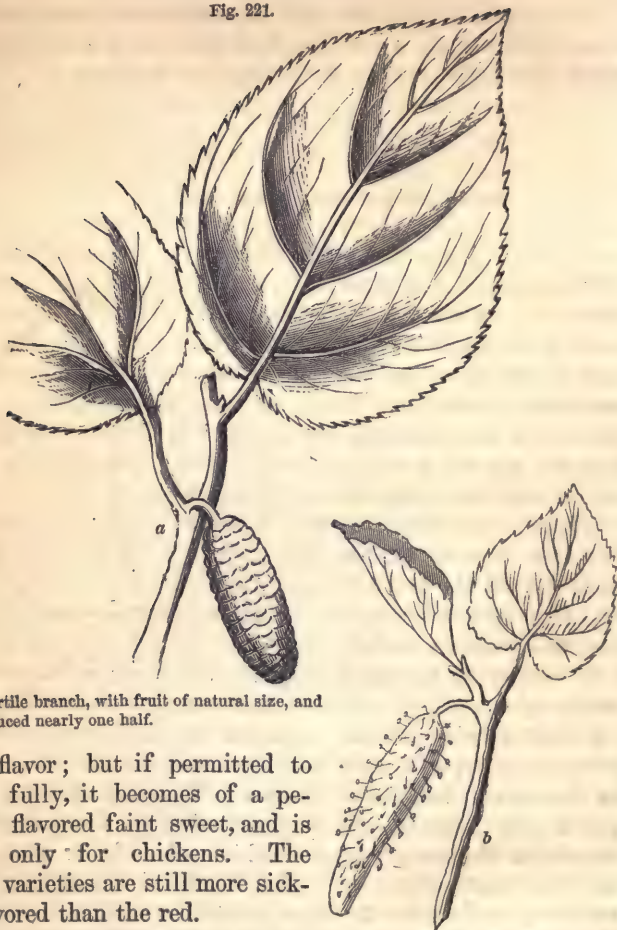
If you desire to convert your building into a warm grapery, you may do so by putting in the heating apparatus described page 475 for the green-house, giving it the same general care and treatment as above directed for cold grapery, except that the vines must be washed off and put up in January or February, or may be left up throughout the year; and the heat, whenever applied, must not be made strong at once, but gradually and slowly raised to a summer temperature.—p. 511-12.

If grapes are cultivated in the green-house, the vines must be planted and laid down for winter just outside the front wall, and may be introduced in proper season by raising the front sash, from the lower corner of which a hole large enough for the stem must be cut out. After the vine is in its place, this must be closed around the stem by stuffing, and the outer portion of the stem and the roots be well covered from the cold.

THE MULBERRY.

The mulberry is one of our abounding wild fruits, and is, perhaps, worthy of more attention and cultivation than it receives. The fruit resembles a long blackberry, and, if gathered and eaten before it becomes dead ripe, has a pleasant

Fig. 221.



a. Fertile branch, with fruit of natural size, and leaf reduced nearly one half.

acid flavor; but if permitted to ripen fully, it becomes of a peculiar flavored faint sweet, and is good only for chickens. The white varieties are still more sickly flavored than the red.

The Johnson Mulberry is an improved seedling from Ohio.

The European variety is larger and less elongated than the American, and is by some esteemed for its flavor, but in this respect it has similar defects.

The trees, which form a fine shade, may be transferred from the woods, or raised from seed or cuttings.

b. Young branch, with its ament or catkin, showing the stamens.

The silk-worm feeds upon the leaves of almost every variety of mulberry, but the white-fruited kinds, with the very large-leaved *Morus Multicaulis*, are chiefly fed for silk.

VARIETIES.

Morus Rubra, or common wild red Mulberry (Fig. 221).

Morus Johnsonii, or Johnson's Mulberry.

Morus Nigra, or European Mulberry.

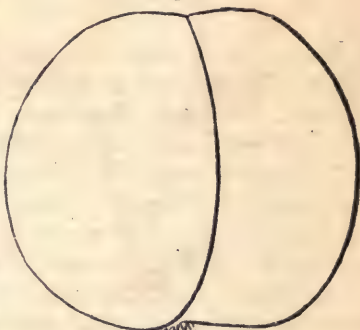
THE NECTARINE.

The Nectarine is a mere sub-variety of the peach, from the pits of which new kinds of the nectarine are sometimes "accidentally" produced. It has a smooth skin, and also some pleasant peculiarities of flavor, which render it a desirable fruit; but it is exposed to the attacks of the curculio and other insects to such an extent as almost entirely to discourage its cultivation.

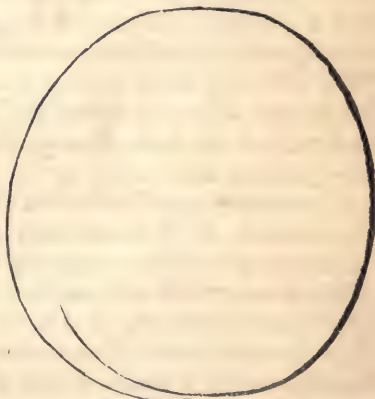
It is treated in all respects like the peach, taking the same precautions against the worm in the root, and adding, as paving can not be resorted to, the practice of jarring the curculio into sheets, as directed for the plum, page 279.

In those districts of country where the latter fruit is successfully raised, the nectarine would probably succeed also, and would be found a pleasant acquisition.

Fig. 222.



a. Small Nectarine.



b. Medium Nectarine.

NECTARINES

Numbered nearly in the order of ripening.

FREESTONES.

- | | | |
|-------------------|--|---------------|
| 1. Early Violet. | | 4. El Ruge. |
| 2. Hunt's Tawney. | | 5. New White. |
| 3. Hardwicke. | | 6. Boston. |

CLINGSTONES.

- | | |
|---------------|-----------|
| 7. Newington. | 8. Roman. |
|---------------|-----------|

NUTS.

The butternut, *Juglans cinerea*; the black walnut, *Juglans nigra*; the shatter-bark hickory-nut, *Carya alba*; and the chestnut, *Castanea Americana*, which are common in the Northern and Eastern States; the chinquapin, or small chestnut, *Castanea pumila*, of Pennsylvania and southward; with the pecan-nut (French *pacanier*), *Juglans olivæformis*, and the peanut of the Southwest and South, are all familiar to my readers. The Madeira-nut, *Juglans regia*, is a thin-shelled and valuable nut, the trees of which are cultivated to some extent among us, but which might probably be grafted upon either the butternut or any variety of the hickory. There are also a number of varieties of filbert, some of which are occasionally seen, but seldom in the green state, in our markets. They generally have thinner shells, and better flavored and larger kernels than the hazel-nut; they are rather elongated in form, and the husk of some kinds is peculiarly and handsomely fringed.

The varieties are the Cosford, the Red-kerneled, the White, the Frizzled. They are all easily raised from offshoots, or may be grafted with perfect success upon the common hazel-nut.

There is a rather new small nut, which, though not a tree, may be mentioned here. It is the EARTH ALMOND or "CHUFA," *Cyperus esculentus*. This sweet and pleasant nut is produced abundantly upon the roots of a plant that resembles low tussock grass. The nuts, which are about the size of large bush beans, should be planted or sown in drills twelve or eighteen inches apart, and an inch deep, at corn-planting

time, and require during their growth only ordinary and not deep culture, with a slight earthing up in the process. The first frost in fall changes the foliage, after which they may be taken up at any time before severe cold, and dried and stored for winter use. They require to be washed or cleaned by friction, and may be eaten as chestnuts, either raw or boiled. They are native in Southern Europe, and are supposed to be nutritive and fattening. In certain soils and localities, however, they might become troublesome as an ineradicable knot grass, of which the plant is a cultivated variety.

OLIVE.

The Olive is a small dark or green plum-like fruit, which, while quite tender, is used for making pickles. For this purpose they are steeped in weak ley, washed off, and bottled in brine, with sweet fennel or spice for flavoring.

They are, however, chiefly valuable for the sweet limpid oil they yield, which in Southern Europe enters largely into the ordinary course of cookery, forms a substitute for butter and cream, and is esteemed as affording both comforts and luxuries in families. It forms also an important article of commerce. The tree attains a height of perhaps twenty feet, bears in a few years after planting, prefers the rockiest limestone regions, such as is the Mount of Olives in sacred story, and is very long lived. It is also tolerably hardy, and probably might be raised to profit at the South. The tree is propagated readily from seeds, cuttings, or layers, and also by small knot-buds, or "eggs," which are formed upon the trunk, and which are planted in the same manner as the seeds, the latter, however, producing the best trees. It might doubtless be grafted successfully on the common wild olive or "devil-wood."

Fig. 223.



a. Single fruit.
b. Branch with young fruit.

THE ORANGE, LEMON, LIME, CITRON, AND SHADDOCK.

Fig. 224.



For all these fruits, the wild orange of the South affords a ready supply of suitable stocks upon which they may be budded or grafted. In forming orange orchards, the trees may be planted from eight to twenty feet apart, in rich, strong soil.

There is a considerable variety of oranges, some of which have red pulp, and all fragrant blossoms. The Bergamot variety yields the essence known by that name, by distillation from its flowers, fruit, and leaves. The Bitter or Seville or-

Fig. 224.



e. Shaddock.

ange is valued for making marmalade. Of the eatable kinds, the St. Michael's, though small, is most esteemed for its delightful sweetness. There is also a sweet lemon grown in Italy, which resembles a second-rate orange.

The lemon is the well-known fine acid fruit of commerce.

The lime is a smaller and somewhat inferior fruit, but is especially esteemed in the green state for preserves.

The citron is a rough fruit, with a very thick rind, larger than the largest lemon, but inferior in the quality of its acid. The candied citron of the confectioners is made from its skin.

The shaddock is a still larger fruit, in form more resembling the orange, curious but worthless.

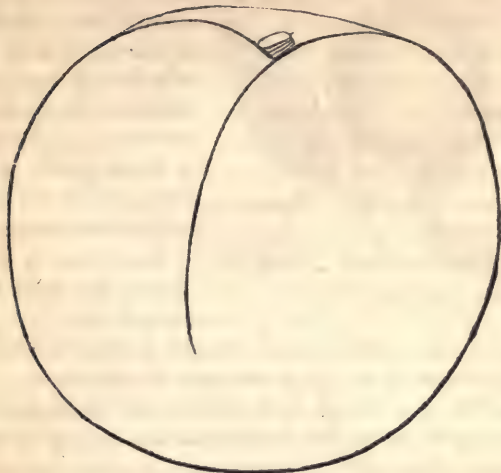
THE PEACH.

Of the two distinct classes into which peaches are divided, as freestones or clings, the cultivation of the latter has been almost entirely abandoned, the exceptions consisting of a few kinds of peculiar excellence or for special uses, as the Heath and Lemon clings. Their other natural division into white, or yellow, or red fleshed, is equally marked, and furnishes some aid in making selections. The finer white-fleshed varieties furnish those of a more sugary and sometimes aromatic flavor; the choice yellow-fleshed are almost uniformly vinous and sprightly; the red-fleshed or blood peach is usually more acid than is agreeable, except for preserving.

There are two common forms of the peach, which are of some distinctness, the round and the long. Generally the rounder forms (Fig. 225 *a*), which are also often slightly flattened, or apple-form, indicate the higher grades of the fruit, and include almost the whole list of superior peaches.

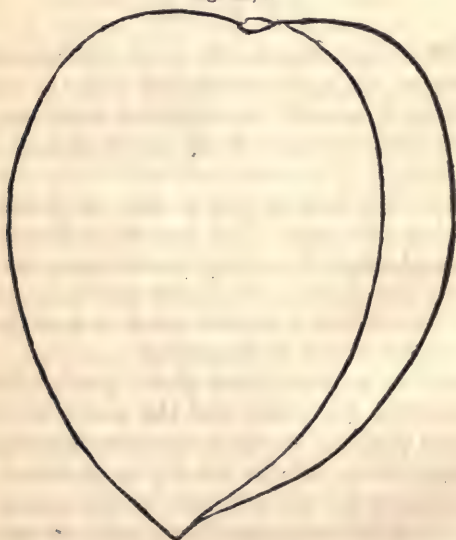
The elongated and compressed forms, with sometimes a heavy

Fig. 225, a.



suture (Fig. 225 b), approximating more nearly to the natural

Fig. 225, b.



and thinner-fleshed form of the almond, include almost all the inferior varieties down to those known as "hog peaches."

Until within the last thirty years, the peach-tree grew so luxuriantly, and bore so abundantly without any care, that the little labor which it now requires to bring it to maturity and renew it every two or three years, since it can not be perpetuated, is not unfrequently neglected or begrudged. It is still the most easily raised of all our larger fruits. A few pits from common and healthy fruit, kept and planted as directed page 204, will furnish stocks of from three to five feet high, ready for budding the first fall, upon which fruit of the finer varieties may be expected in the third or fourth year from the pit. If from any cause seedling peach stocks are not budded in the fall of their first year, unless a high-stemmed stock is desired, cut them down to the ground early in the following spring, and permit a single shoot to grow from the stump for budding in the succeeding fall. The necessity for this course should be avoided by timely planting of the pits, careful summer culture of the young plants, and attention to budding and unbinding in proper season; but if it becomes necessary, it is better than to leave the stock to an uninterrupted second year's growth. The young trees may be set out and headed down either the following spring before the bud starts, or, being headed down, as directed page 225, may be left to stand another year, when the growth from the bud will vary from four to seven or eight feet high.

In their culture, from the start, let the head of the tree be kept moderately open by cutting out a foot or two of the extremity or leader of the first year's growth from the bud, thinning the branches annually afterward, and every spring shortening each young shoot one half of its growth of the previous year. Set your peach-trees where they can be kept clean, and cultivated as summer crops, and never, if it can be avoided, where the sod is to remain unbroken around them. If this can not be conveniently avoided, treat them with liquid manure repeatedly through the summer over a space somewhat larger than the spread of the top, and dress in the spring with ash compost or guano to the same extent; yet be careful in all

cases not to stimulate them too highly, especially in northern latitudes, or they will probably be winter-killed.

For modes of treating the worm and yellows, see pages 262 and 277.

In orchard culture, the trees are set out at from twelve to fifteen feet apart, and cultivated with the plow, more or less of summer crops, as potatoes, &c., being raised between them. The trees usually yield two or three crops and die, being succeeded by new plantings upon other spots. Under this system, the light sands of New Jersey and the richer soils of Delaware furnish the immense annual supplies which, unless cut off by frost, glut our city markets.

SELECT LIST OF PEACHES,

Numbered nearly in the order in which they will ripen in any given soil and latitude, with their usual time of ripening at New York.

The size of this fruit depends so much upon soil, culture, &c., that I have not deemed it worth while to note it particularly. Those marked with a star are yellow-fleshed.

FREESTONES.

- | | |
|--|--|
| 1. Tillotson, ripens early in August. | *12. Bergen Yellow, early in September. |
| 2. Troth's Early, early in August. | 13. Nivette, early in September. |
| 3. Gross Mignonne, mid-August. | *14. Scott's Nonpareil, mid-September. |
| 4. Coolidge's Favorite, mid-August. | 15. Morris White, September. |
| 5. Early York (Serrate), after mid-August. | 16. Late Admirable, mid-September. |
| 6. Walter's Early, late August. | *17. Crawford's Late, after mid-September. |
| 7. Red Rareripec (Morris's), last of August. | 18. Druid Hill, last of September. |
| 8. George the Fourth, late August. | 19. La Grange, last of September and into October. |
| *9. Crawford's Early, last of August. | 20. Ward's Late, early in October. |
| 10. Noblesse, last of August. | |
| 11. Oldmixon Free, early in September. | |

CLINGS.

- | | |
|---|---------------------------------------|
| 21. Oldmixon Cling, early in September. | 23. Hyslop's Cling, early in October. |
| *22. Lemon Cling, after mid-September. | 24. Heath Cling, October, and keeps. |

THE PEAR.

If there is some difficulty in making choice of an assortment of apples, there is still more in suitably selecting pears.

This arises not only from the great number of kinds, increased by the annual introduction of new ones, but also still more from the generally perishable nature of the fruit, and its extreme liability to vary in character, and often to become worthless from peculiarities of soil, season, or general climate. Individual taste has also more to do with the reputation of pears than perhaps with that of any other fruit, comparatively few persons having such a range of acquaintance with kinds as to qualify them to form a discriminating judgment by comparison.

A gentleman who, in his youth, had eaten pears from a certain tree, and remembered them as finer than any others he had ever tasted, rode forty miles to enjoy again the favorite of his boyhood, and to obtain scions that he might place it foremost in his fruit garden, but he found it utterly worthless in comparison with those he already possessed. The circle of his knowledge had been enlarged, and his maturer judgment did not verify the impression of his inexperience.

We have, however, attempted to name an assortment of kinds that will not disappoint the cultivator, although in reference to some of them much diversity of opinion still exists, and careful attention to the remarks on introducing new varieties (pages 190 and 192) is especially urged in this connection.

Pear-trees generally, if on good seedling stocks, form longer, and fewer, and less fibrous roots than apple or cherry-trees. It is therefore peculiarly proper that they should be set out while small, having their roots well shortened, and the top cut back to balance. A strong cedar, or locust, or chestnut-stake, deeply set by each tree, will defend it; and if the tree be of irregular or drooping habit, the stake may be used to support it, and aid in training it upward. See page 246. Many kinds of pear-trees have habits of growth that render them unsightly, and make it sometimes difficult to secure the fruit, the tree be-

ing either straggling or rampant. Such should be carefully watched and summer pruned by nipping, and, if need be, by cutting back in August. The Seckel, and, still more strikingly, the Lodge, when growing naturally on moderate soil, afford models for the general formation of the head of pear-trees, although each of these may need to have the young cross-shoots nipped out, and occasionally, perhaps, the shortening of a vigorous upright leader.

The distance for planting pear-trees may be from twenty to thirty feet each way, the trees being alternated or in diamond form, not in precise squares. Dwarfed pears may be set from six to ten feet apart.

The best soil for pears, in general, is a deep warm loam, but there are varieties suited to all soils; and even from those which are cold and unpromising, if the hardier and sweeter summer and fall varieties are selected, fruit of fair quality may be obtained, if it is properly treated after being gathered.

Winter pears may be suffered to hang as long as they are safe from frost, but all the varieties of summer and fall pears should be gathered before they "turn" upon the tree, and be kept in a warm, dry room to hasten their ripening; but if it be an object to retard this, or for all winter kinds, let them be wrapped and packed in barrels or boxes as directed for the finer apples, page 289. On being brought from their cool place of deposit into the warmth in such small quantities as may from time to time be desirable, they will ripen promptly and finely for use.

There are as yet but few very fine winter or spring varieties of pears, and the variableness of character above referred to is perhaps more noticeable and more discouraging to the cultivator in these than in the ordinary summer and fall kinds, but such as we have will well repay the care needed for preserving and ripening them.

Winter pears, suitable for cooking, abound, and may be kept safely in barrels in the same manner as apples; and when baked or stewed as directed for the latter, page 289, but with water enough to cover them, they constitute another healthful and pleasant substitute for indigestible sweetmeats or preserves.

SELECT LIST OF PEARS

Numbered nearly in the order in which they will ripen in any given soil and latitude.

Most of the kinds will succeed dwarfed upon the quince, perhaps especially the varieties named from 1 to 11. See page 206. In a few kinds the size and quality of the fruit will be improved by this process, particularly Louise Bonne de Jersey, Beurré Diel, Duchesse d'Angoulême, and some others. The ordinary time of their ripening at New York accompanies the figure and description given below.

- | | |
|-----------------------------|---------------------------------------|
| 1. Madeline. | 22. Petre. |
| 2. Bloodgood. | 23. Seckel. |
| 3. Dearborn's Seedling. | 24. Virgalieu (or White Doyenné). |
| 4. Julienne. | 25. Gray Virgalieu (or Gray Doyenné). |
| 5. Tyson. | 26. Beurré Diel. |
| 6. Rostiezer. | 27. Duchesse d'Angoulême. |
| 7. Summer Franc Real. | 28. Dix. |
| 8. Bartlett. | 29. Onondaga. |
| 9. Canandaigua. | 30. Oswego Beurré. |
| 10. Vanilla. | 31. Beurré d'Aremberg. |
| 11. Stevens's Genesee. | 32. Glout Morceau. |
| 12. Dunmore. | 33. Passe Colmar. |
| 13. Heathcot. | 34. Lawrence. |
| 14. Fondante d'Automne. | 35. Columbia. |
| 15. Lodge. | 36. Knight's Monarch. |
| 16. Flemish Beauty. | 37. Chaumontelle. |
| 17. Maria Louisa. | 38. Winter Nelis. |
| 18. Ananas. | 39. Winter Bell. |
| 19. Louise Bonne de Jersey. | 40. Easter Beurré. |
| 20. Beurré Bosc. | |
| 21. Urbaniste. | |

Heretofore the orchard cultivation of winter pears, either for eating out of hand or cooking, has not been extensively pursued; a few of the larger kinds of the latter class have for many years been raised for exportation to the West Indies and the extreme South. The cultivation of both classes might, no doubt, be profitably extended. Those calculated for cooking only, as the Winter Bell, Cattillac, and Black Pear of Worcester, may be successfully raised in localities and on soils too cold for the production of the others.

1. MADELINE.

Fig. 226.



Tree of free but not vigorous growth; shoots reddish - brown. Hardy, and bears well.

Fruit below medium; pretty uniformly turbinate; dull yellow, slightly russeted.

Flesh yellowish-white, buttery, melting.

Flavor rich, sweet, and aromatic.

Ripens best in the house, from last of July to near mid-August.

Tree erect and very vigorous; young shoots olive.

Bears early and well, but is subject to sour-sap blight, particularly in rich, moist soils.

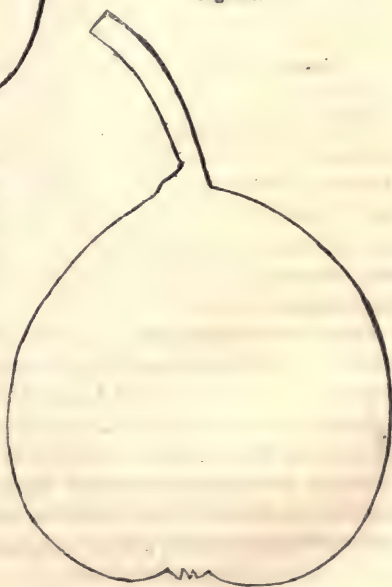
Fruit below medium; almost obovate; smooth yellowish-green.

Flesh white, melting, juicy; sweet, sometimes slightly acid.

Matures from the middle to the last of July. Should be gathered in season, and ripened in the house.

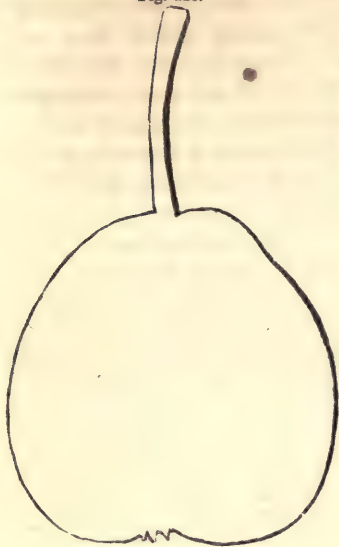
2. BLOODGOOD.

Fig. 227.



3. DEARBORN'S SEEDLING.

Fig. 228.



Tree vigorous, rather spreading; shoots dark brown. Bears abundantly in all soils.

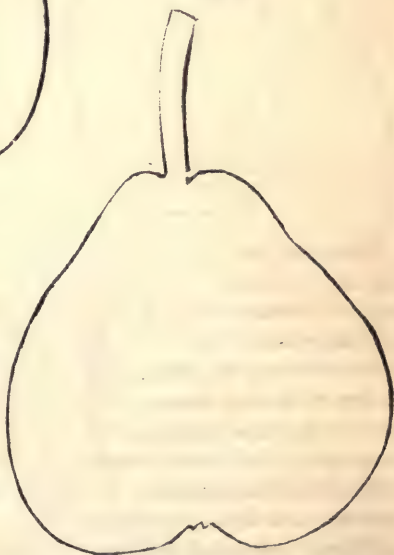
Fruit small; regularly turbinate; light clear yellow, with a little russet. Skin very thin.

Flesh white, juicy, melting.

Flavor sweet and sprightly, with a pleasant perfume.

4. JULIENNE.

Fig. 229.



Tree thrifty, upright; shoots light yellowish-brown. A good and constant bearer, but suited only for rich, warm soils and favorable localities; requiring high culture.

Fruit below medium; regular obovate; clear yellow.

Flesh white, and half buttery, not fine-grained.

Flavor sweet, sometimes very slightly astringent, and, when raised in warm soils, with house ripening, very good.

Ripens in the latter part of August.

5. TYSON.

Fig. 230.



Tree erect, of great vigor; shoots dark olive. Bears well.

Fruit small; nearly pyriform; dull yellowish-green, with a reddish-brown cheek, and a little russeted.

Flesh not fine-grained, but extremely juicy and melting.

Flavor sweet, rich, and perfumed. One of the best summer pears. Ripens last of August and onward.

Tree upright, vigorous; young shoots dark reddish-brown. Bears well.

Fruit nearly medium; short pyriform, irregular; yellow, a little russet, with red-brown cheek.

Flesh white, fine-grained, melting, and juicy.

Flavor sugary, aromatic, and fine. Ripens last of August.

6. ROSTIEZER.

Fig. 231.



7. SUMMER FRANC REAL.

Fig. 232.



Tree hardy, and of moderate growth ; young shoots downy. Bears well in all soils.

Fruit nearly medium ; somewhat obovate, largest in the middle, and tapering pretty equally each way ; yellowish-green.

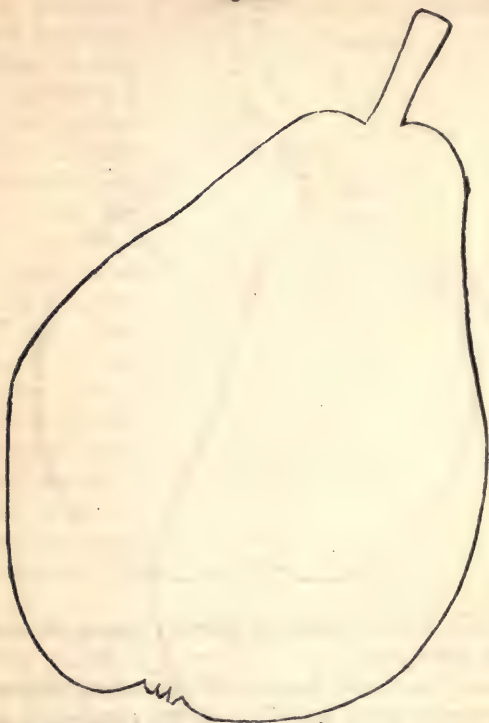
Flesh white, fine-grained, buttery, and melting.

Flavor sweet, rich, and excellent. Ripens last of August and first of September.

The Franc Real is one of the most desirable of summer pears. In favorable circumstances it is almost uniformly of fair size, and perfect. Its character is very decidedly above that of any pear which precedes it in ripening ; and with its facility of adaptation to various soils, its healthful growth, and good bearing qualities, it will be found an acquisition to the fruit plot. Its name is said to be derived from a Spanish gold coin.

8. BARTLETT.

Fig. 233.



Tree upright, and tolerably thrifty ; young shoots yellowish-brown. Bears early and freely.

Fruit large to very large ; variable in form, mostly obtuse pyriform, often almost oval pyriform, imperfectly pyramidal, sometimes nearly obovate ; clear yellow when ripe, with sometimes a blush cheek, and smooth but wavy surface. Stem rather short.

Flesh white, fine-grained, juicy, and melting.

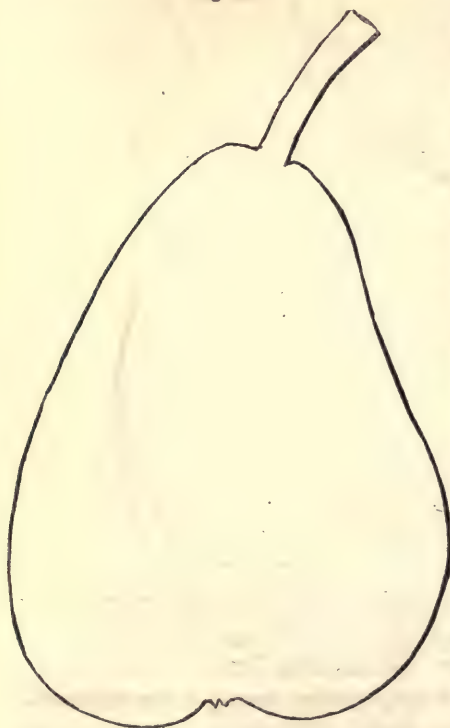
Flavor fine, sprightly, vinous, with a pleasant perfume. In cold soils and unfavorable localities subacid or almost acid.

Ripens from mid-August to mid-September.

9. CANANDAIGUA.

Tree extremely vigorous, throwing up a growth of six or

Fig. 234.



eight feet from the graft in one season, demanding careful cutting back to give strength of stem, otherwise apt to lop and grow unsymmetrically. Young shoots dark olive-green, erect. An early and heavy bearer. Fruit large to very large, irregular pyriform, sometimes almost oval pyriform; dull yellow, with thin russet spots, and many small obscure indentations of surface. Stem rather long.

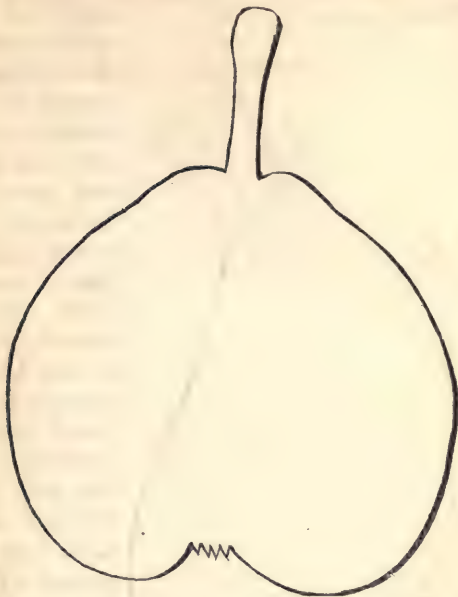
Flesh yellowish-white, fine-grained, buttery, perfectly melting, and very juicy.

Flavor rich vinous and perfumed. Ripens with the Bartlett from the last of August to the middle of September; is sometimes sold for Bartlett, which it often closely resembles, but is probably, on the whole, superior to it.

It is an American pear of striking and peculiar excellences; and though the place and date of its origin are in uncertainty, it has, by common consent, received the name of Canandaigua, having at least been most largely disseminated from that beautiful village and region.

10. VANILLA.

Fig. 235.



Tree upright, of free growth while young, but checking with its early and abundant bearing, and forming a somewhat spreading head. Young shoots dark olive-brown. Fruit medium or below, especially when bearing heavily; round, obovate, slightly unequal-sided; bright grass-green, becoming yellow, with a few russet spots, and a little light brown russet at the insertion of the stem and in the eye.

Flesh white, fine-grained, buttery, and melting.

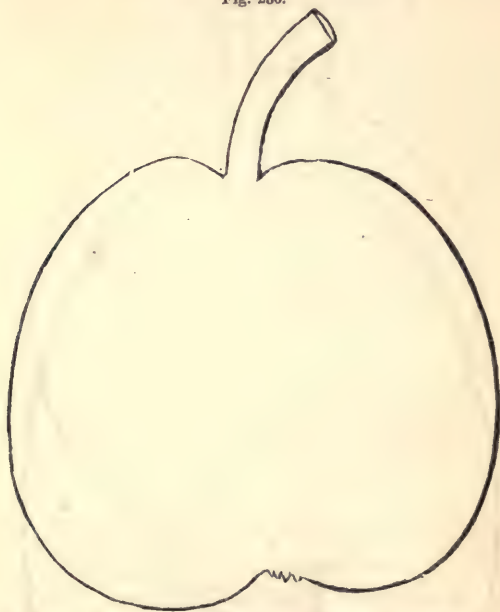
Flavor peculiarly high, rich, and aromatic, with a vanilla fragrance. Ripens about the last of September.

The original tree of this exquisite pear was found and still stands upon the old Huguenot Church property at New Rochelle, Westchester county, whence it has been disseminated to a limited extent under the names of "Church" and "New

Rochelle" pear, and perhaps also by other names in different localities; but the name given above is to be preferred, as descriptive of its most obvious peculiarity when carefully and properly ripened.

11. STEVENS'S GENESEE.

Fig. 236.



Tree of great vigor, young shoots dark gray, diverging, subject to sour-sap blight. A good bearer.

Fruit above medium, round, obovate, light yellow, a little rough. Flesh white, half buttery, and juicy.

Flavor fine rich aromatic. Ripens in September.

This pear is said to be a native of Livingston county, and is one of the most valuable of the new pears which Western New York has furnished. It belongs to the class of Bergamot pears, of which hitherto there have been few good ones, except Gansell's. It, however, requires guarding against the risk of sour-sap blight, to which it is subject. See page 261.

12. DUNMORE.

Fig. 287.



Tree of rather strong growth, young shoots brownish slate-color, erect. A very good bearer, its blossoms standing pretty hard frosts without injury. Fruit large, oblong-ovate, greenish, with some brownish-red russet.

Flesh yellowish-white, buttery, and very melting. Flavor variable. With high culture, in favorable circumstances, rich

and high-flavored; in opposite conditions often worthless. It is suited to warm soils and locations. Ripens from middle of September to October.

13. HEATHCOT.

Fig. 238.



Tree upright, thrifty, and hardy, with reddish-brown shoots. An abundant bearer.

Fruit medium, obovate or slightly rounded; greenish-yellow, with considerable thin russet. Flesh white, buttery, rather juicy and melting.

Flavor vinous, sprightly, and perfumed. Ripens last of September.

This fruit, which originated in Massachusetts less than half a century ago, though not of the very highest quality, is valuable for garden or orchard culture.

14. FONDANTE D'AUTOMNE.

Fig. 239.



Tree hardy, of moderate upright growth; shoots yellowish-gray. A good bearer, but suited to dry, warm soils.

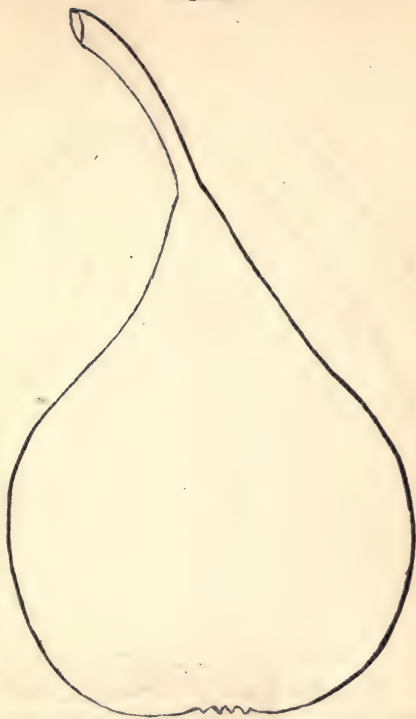
Fruit medium, obovate, pyriform; pale greenish-yellow, with slight russet. Flesh white, fine-grained, melting, and juicy.

Flavor very variable; in suitable soil, rich, sugary, perfumed, and delicious; in moist soils often worthless. Ripens in the latter part of September.

This is a Flemish fruit, and strikingly illustrates the remarks we have made on the effect of soil and the diversity in individual estimate of the character of pears. In favorable circumstances it is of very superior quality, and meets the highest commendation; in opposite conditions its character is quite inferior, and it is deemed a worthless outcast.

15. LODGE.

Fig. 240.

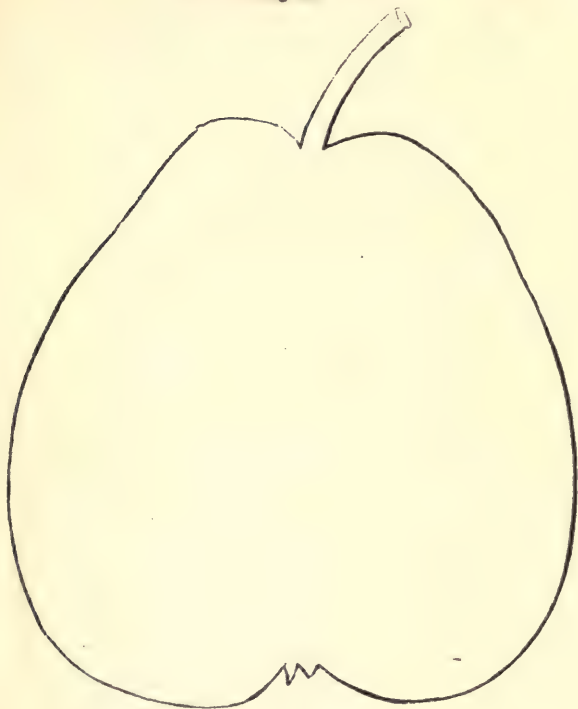


Tree upright, of moderate growth, forming naturally a perfectly symmetrical "model" head, through which the fruit hangs singly. Young shoots light brown, with gray specks; short jointed. Bears well annually, even while quite young. Requires warm soil and care north of latitude 40° . Fruit of medium size (the figure is small), variable, generally pyriform, a little one-sided, but sometimes angular or ribbed; greenish, covered with clear brown russet.

Flesh white, very juicy, melting, and vinous; when fully ripe, excellent. South of New York it matures thoroughly, and stands deservedly high. Ripens about the last of September.

16. FLEMISH BEAUTY.

Fig. 241.



Tree of very luxuriant growth, upright.

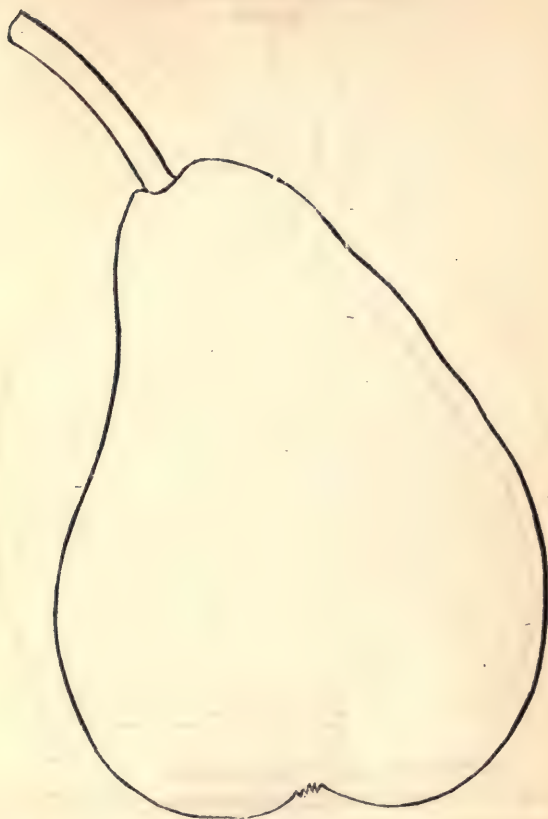
Young shoots dark brown. Bears young and freely, of fair, handsome fruit.

Fruit large obovate, rather rough, and slightly russeted; pale yellow, with a reddish-brown cheek.

Flesh yellowish-white, rather coarse, but melting and juicy.

Flavor variable. In warm soils, and with early gathering and house-ripening, it is rich, sugary, aromatic, and excellent, but if left too long on the tree it is apt to soften at the core and become flavorless. Ripens the last of September, and should be eaten without delay.

17. MARIA LOUISA.



Tree of strong but straggling growth.

Shoots olive-gray; a good bearer, suited to warm soils and locations, and high culture.

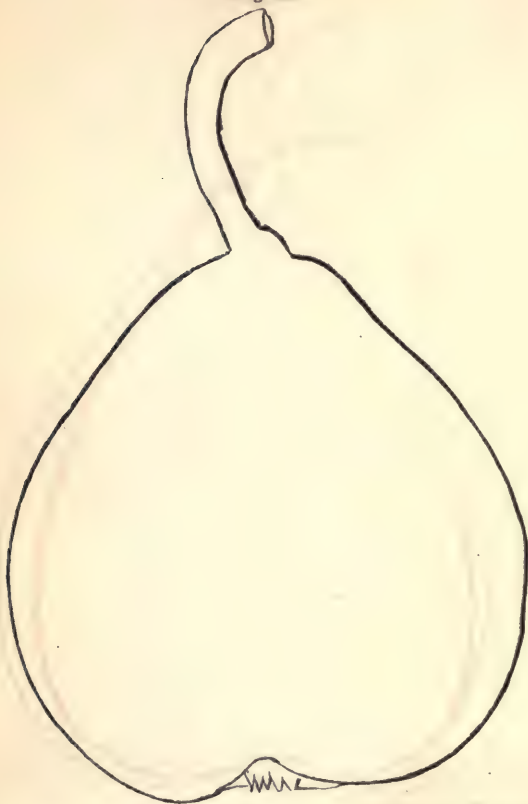
Fruit large, pyriform, inclining to oblong; unequal-sided. Greenish, with some light russet.

Flesh white, melting, and buttery.

Flavor quite variable; in suitable conditions, rich, sugary, and finely vinous. Ripens last of September and October.

18. ANANAS.

Fig. 243.



Tree vigorous.

Young shoots dark brown or olive; an early and regular bearer.

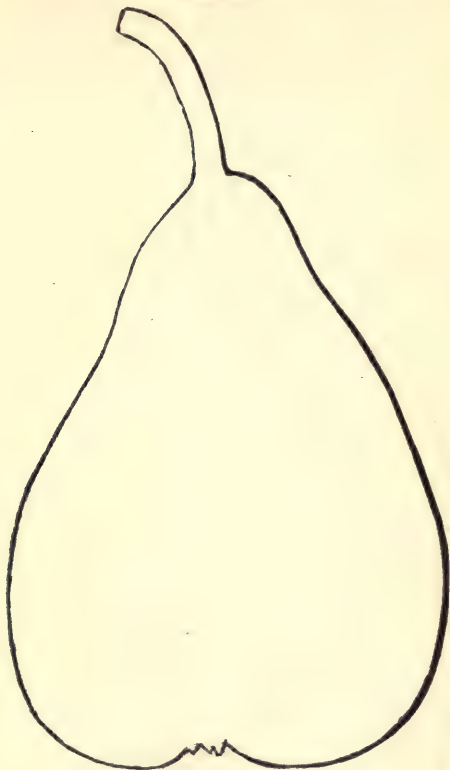
Fruit uniformly above medium, often large, roundish obovate, but variable, sometimes angular or oval obovate; dull yellowish-green, marbled with rough brown russet.

Flesh whitish, fine-grained, melting, and buttery.

Flavor sweet, rich, and perfumed. Ripens in all September.

19. LOUISE BONNE DE JERSEY.

Fig. 244.



Tree upright, vigorous, and hardy.

Young shoots dark brown or purplish-olive, with gray specks.

A very good bearer of uniformly fair fruit.

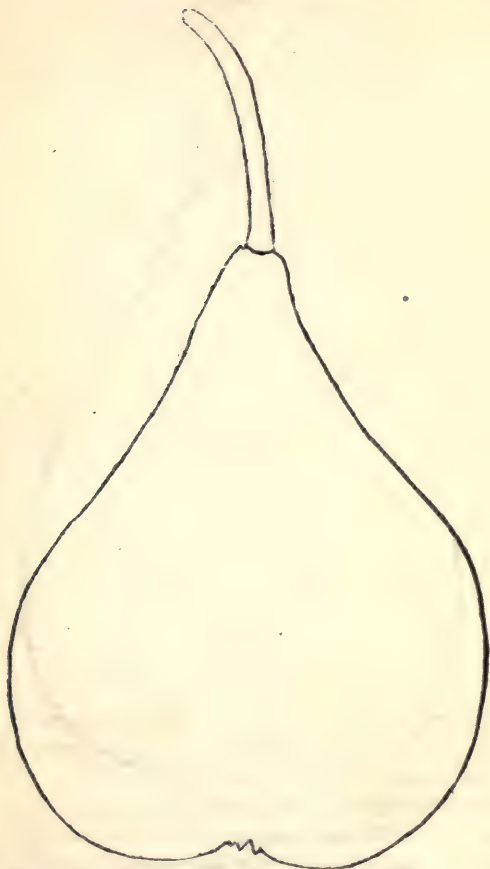
Fruit above medium or large; regular pyriform, or very slightly one-sided; pale green, with grayish dots and brownish-red cheek.

Flesh yellowish-white, juicy, and melting.

Flavor rich, rather vinous, excellent. Ripens from middle of September into October.

20. BEURRÉ BOSC.

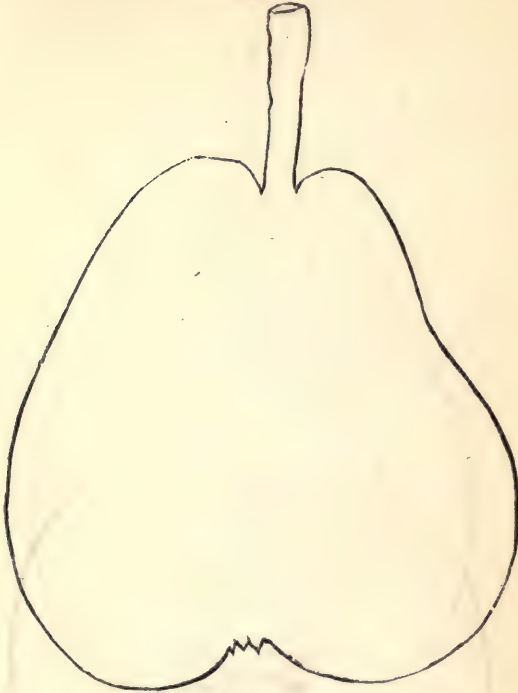
Fig. 245.



Tree of moderate vigor and straggling growth.
Young shoots brownish-olive. Bears fairly and regularly.
Fruit pretty long-necked or acute pyriform; yellow, with some light russet, and a brownish-red in the sun.
Flesh white, melting, and buttery.
Flavor rich, sweet, and perfumed. Ripens through October.

21. URBANISTE.

Fig. 246.



Tree upright, healthful, and moderately vigorous.

Young shoots grayish-yellow. Not an early, but a good bearer, and suiting well in rich soils.

Fruit medium obovate, inclining to pyramidal ; light yellow, with gray dots and some russet.

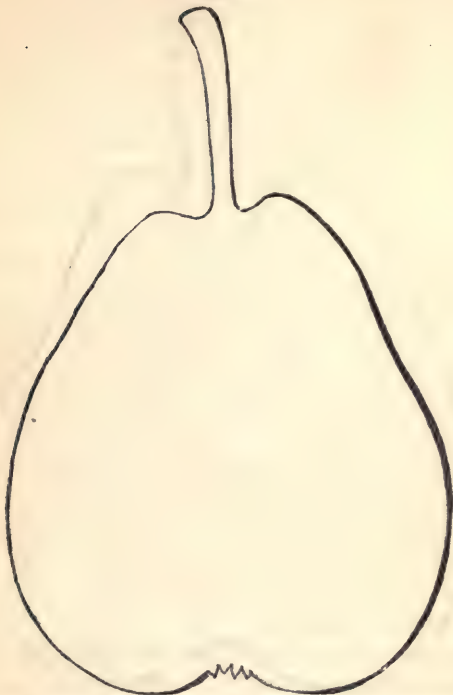
Flesh white or yellowish, buttery, melting, and very juicy.

Flavor rich, perfumed, vinous, or sweet. Ripens in the house through October and November.

The Urbaniste resembles the Virgalieu in quality, and somewhat also in appearance, though, in general, rather smaller. It is of fine healthful growth, and, once in bearing, continues to yield its fruit regularly and abundantly.

22. PETRE.

Fig. 247.



Tree of moderate growth.

Young shoots slender, yellowish-brown. A good bearer.

Fruit medium obovate, pyriform; light yellow, with some greenish russet.

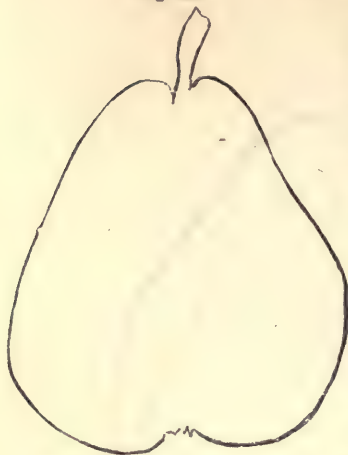
Flesh whitish, fine-grained, buttery.

Flavor sweet, rich, with a high musky flavor when in perfection. Ripens in October, and keeps into November.

This is a desirable and valuable pear of the Virgalieu class, which, if gathered early, may be kept for some time. It was raised in Philadelphia by Mr. Bartram, from seed sent to him from London in 1735 by Lord Petré.

23. SECKEL.

Fig. 248.



Tree of healthful, but not rapid growth, forming a compact symmetrical head, not attaining a very large size.

Young shoots brown-olive, stout and short. A good and regular bearer.

Fruit small obovate, reddish-brown.

Flesh white, buttery, juicy, and melting.

Flavor peculiarly high, rich, and aromatic. The very finest of pears. Ripens in the house through September and October, or later.

This small but exquisite fruit stands deservedly at the head of all pears for its peculiarly rich, high flavor. There is no European variety that resembles or compares with it. It is not a result of careful, intelligent cultivation, but, like many of our foremost fruits, an "accidental variety," the precise derivation of which is unknown.

The original tree was found near the Delaware, a few miles from Philadelphia, and was in bearing at the period of the Revolution; but the fruit remained in obscurity until the land on which the parent tree stood, and perhaps still stands, became the property of Mr. Seckel, after whom the pear is named, and by whom it was first brought to public notice.

24. VIRGALIEU. (*Fig. 249*).

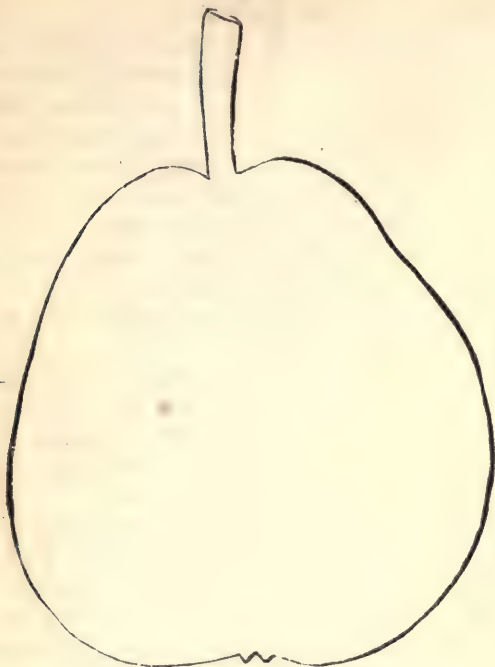
Tree upright, of medium strength.

Young shoots light brown; productive.

Fruit medium or above, obovate, variable, sometimes almost pyriform; pale clear yellow, speckled with small dots, sometimes having a fine red cheek.

Flesh white, very fine-grained, buttery, and melting.

Fig. 249.



Flavor rich and exquisite, second only to the Seckel. Ripens in the house through October and November.

25. GRAY VIRGALIEU.

Tree upright, tolerably vigorous, healthier than the Virgalieu.

Young shoots grayish-brown, or brown with gray dots. A good and constant bearer.

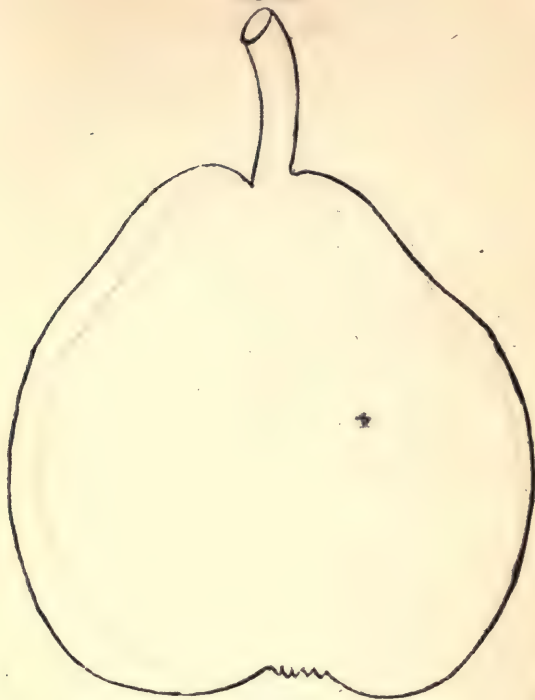
Fruit medium, roundish obovate, covered with rather light or golden russet when perfectly ripe.

Flesh white, very fine-grained, melting, buttery.

Flavor rich and exquisite, similar to the "Virgalieu," but ripens a little later.

In cold or unfavorable soils or localities this fine pear some-

Fig. 250.



times blasts, but succeeds well near New York city and south of it.

26. BEURRÉ DIÉL (*Fig. 251*).

Tree quite vigorous, but twisting in its growth.

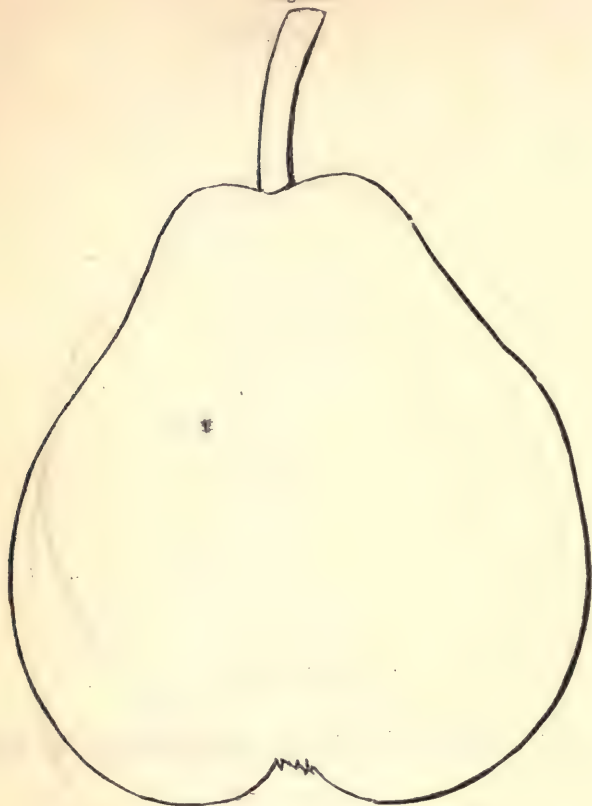
Young shoots dark grayish-brown. A good bearer, suited with high culture and warm soil and season.

Fruit large, obovate to obtuse pyriform, uneven, of a greenish-yellow, becoming deep yellow, with large spots of russet.

Flesh yellowish-white, somewhat coarse, half melting, and sometimes buttery.

Flavor variable; when well ripened, rich, sugary, and excellent. Ripens through October and November.

Fig. 251.



27. DUCHESSE D'ANGOULEME.

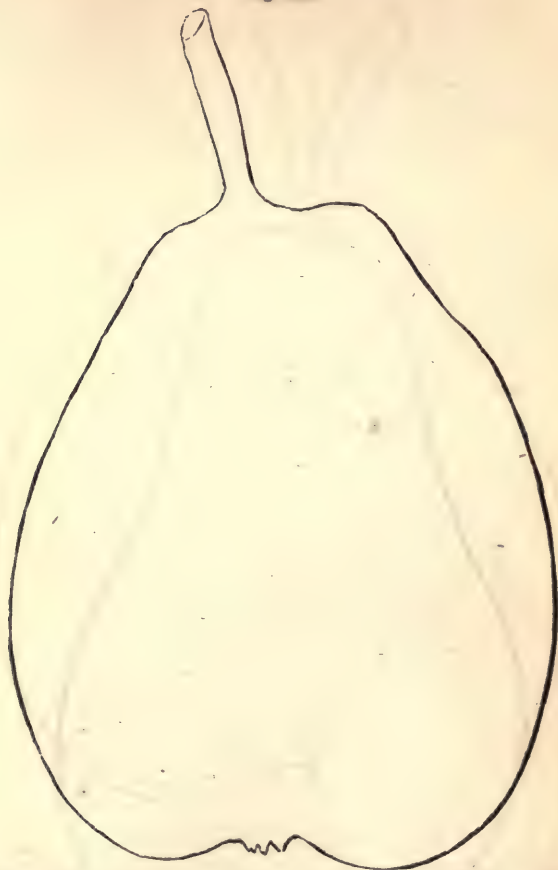
Tree of upright, very strong growth, its luxuriance often requiring to be checked by summer or root pruning.

Young shoots light yellowish-brown. A fair bearer; best suited to warm soils and latitudes.

Fruit very large, generally obtuse pyriform or oblong-obovate; surface knobby and uneven, greenish-yellow, with spots and streaks of russet.

Flesh yellowish-white, rather coarse, juicy, melting, and buttery.

Fig. 252.



Flavor very variable ; on quince stocks, or where the fruit is perfected, rich and very good, but worthless on pear stocks at the north. Ripens from October to November.

28. DIX (*Fig. 253*).

Tree erect and of moderate vigor.

Young shoots slender, pale yellow, not coming into bearing early, but hardy and productive when of age.

R 2

Fig. 253.



Fruit large, oblong pyriform, rather rough, deep yellow, with spots of russet.

Flesh not very fine-grained, but juicy and melting.

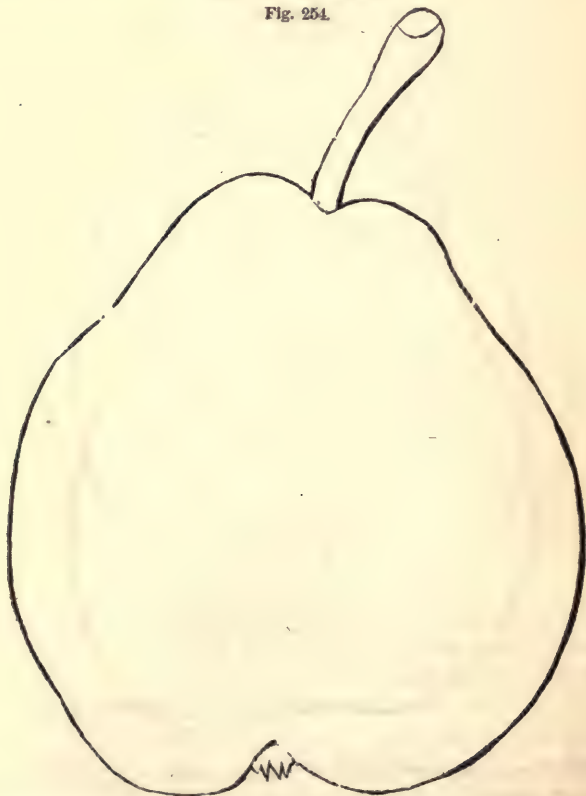
Flavor rich, sugary, and vinous, with a fine aroma.

Ripens through October and November.

The original tree of this variety stands in the garden of Mrs. Dix, of Boston, after whom the fruit is named, and has been in bearing only about thirty years. It does not bear well while young, which may be regarded as an advantage on the whole, and as indicating soundness of constitution, and warranting the expectation of a fruitful and prolonged maturity.

29. ONONDAGA.

Fig. 254.



Tree upright, vigorous.

Young shoots yellowish-green or light olive. An early and regular bearer.

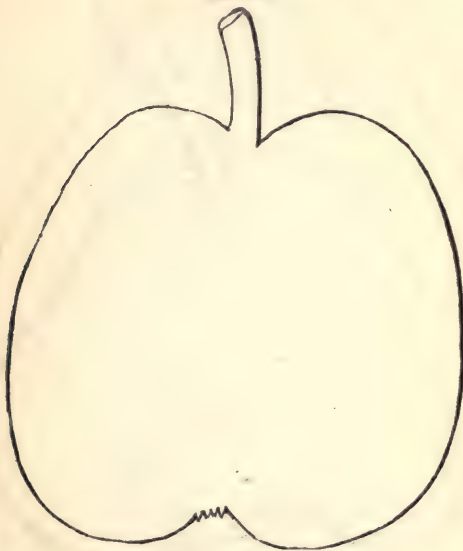
Fruit large, variable, obovate or oval pyriform; golden yellow when fully ripe, with russet dots, and sometimes a faint blush cheek.

Flesh white, juicy, and buttery.

Flavor varying; at its best, rich, aromatic, and vinous, or slightly subacid. Ripens in October and November.

30. OSWEGO.

Fig. 255.



Tree hardy and vigorous, of rather spreading habit.

Young shoots reddish-brown, with many distinct gray dots. Bears early and abundantly.

Fruit medium, roundish obovate; dull yellowish-green, with spots of thin russet.

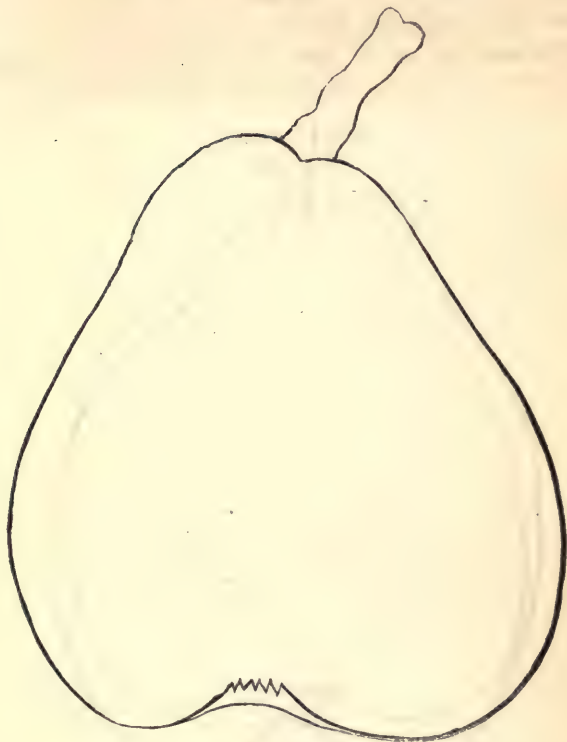
Flesh white, melting, and juicy.

Flavor sprightly, vinous, or almost sweet. Ripens in October and November.

This is a native of Western New York, hardy, very productive, and an early bearer either on pear or quince.

31. BEURRÉ D'AREMBERG.

Fig. 256.



Tree strong, upright, with young shoots of a yellowish-brown, with pale specks. An abundant and constant bearer of fine fruit, but requiring high culture and summer pruning, with careful ripening, to perfect it.

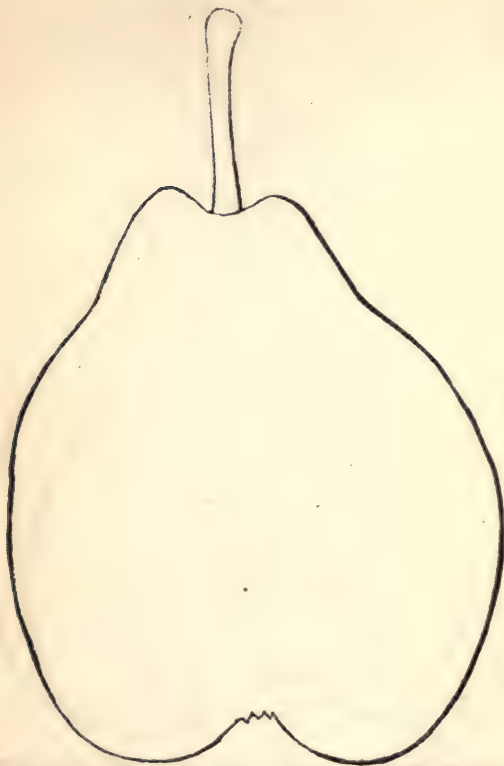
Fruit pretty large, obovate, with much taper toward the stem, becoming obtuse pyriform; yellow, with much light russet.

Flesh white, buttery, and melting, and quite juicy.

Flavor rich, sprightly, and vinous. Ripens from November to January.

32. GLOUT MORCEAU.

Fig. 257.



Tree of fine pyramidal growth, somewhat spreading.

Young shoots of a bluish or olive-green. A good bearer, suited with strong soil and high culture.

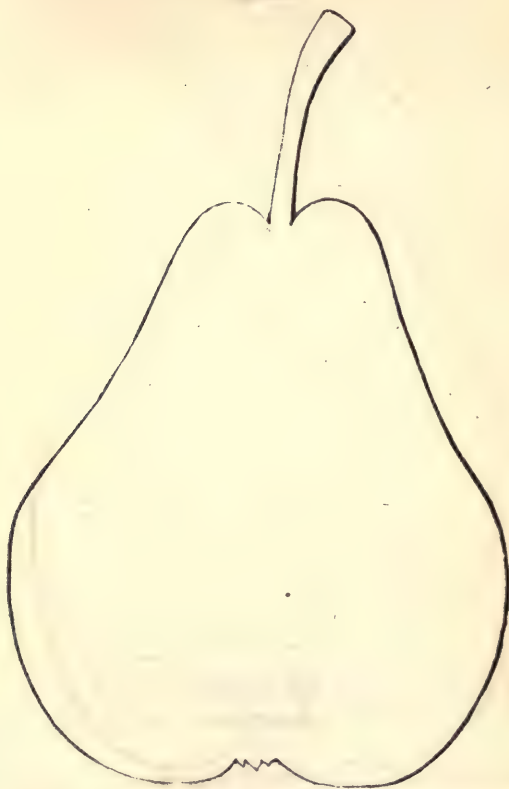
Fruit large, almost oval or obtuse pyriform, often irregular; greenish-yellow, with some russet and many greenish russet specks.

Flesh white, fine-grained, melting, and buttery.

Flavor rich, perfumed, dead sweet. Ripens from December to February.

33. PASSE COLMAR.

Fig. 258.



Tree very vigorous, with long, straggling, brownish-yellow shoots. Often bears too abundantly, and requires that the crop be thinned. Needs high culture.

Fruit pretty large, variable, obtuse pyriform or obovate; pale yellow at maturity, with considerable sprinkling of russet.

Flesh yellowish-white, juicy, and buttery.

Flavor, when well ripened, rich, sweet, and aromatic. Ripens from November to January.

34. LAWRENCE.

Fig. 259.



Tree of moderate vigor and somewhat thorny.

Young shoots light brown, rather slender. An abundant bearer.

Fruit rather large, long obovate, sometimes almost pyriform, obtuse at the stem; dull yellowish-green, with small patches of russet near the ends.

Flesh yellowish-white, juicy, melting, sometimes gritty at the core.

Flavor, when well raised and ripened, rich and sugary. Ripens from November throughout the winter.

The Lawrence is a new American pear, which originated at Flushing, Long Island, a few years ago, and promises to be an acquisition, particularly for orchard culture, either on the pear

or quince stock, affording a good winter fruit, not liable to shrivel or decay.

35. COLUMBIA.

Fig. 260.



Tree of upright strong growth, with brownish-yellow shoots. Bears largely and constantly; fair marketable fruit.

Fruit rather large, regular, long obovate, inclining to oblong; fine golden yellow at maturity, with gray dots.

Flesh white, not fine-grained, but juicy and melting.

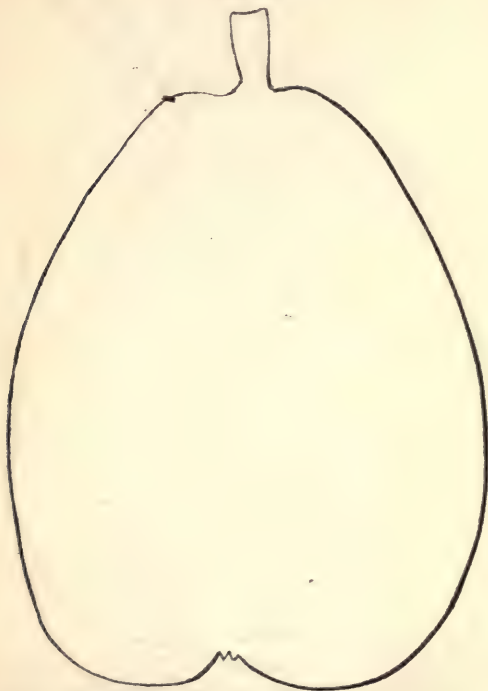
Flavor sweet, rich, and aromatic. Ripens through December and into January.

This fruit originated upon the land of Mr. Andrew Corsa, in the lower part of Westchester county, New York. The parent

tree has been supposed to have sprung from a seed thrown away by some soldier of the British Hessian troops, whose encampment at one period of the Revolutionary war covered or adjoined the spot where it grew.

36. KNIGHT'S MONARCH.

Fig. 261.



Tree strong, upright.

Young shoots yellowish or light olive. An abundant bearer.

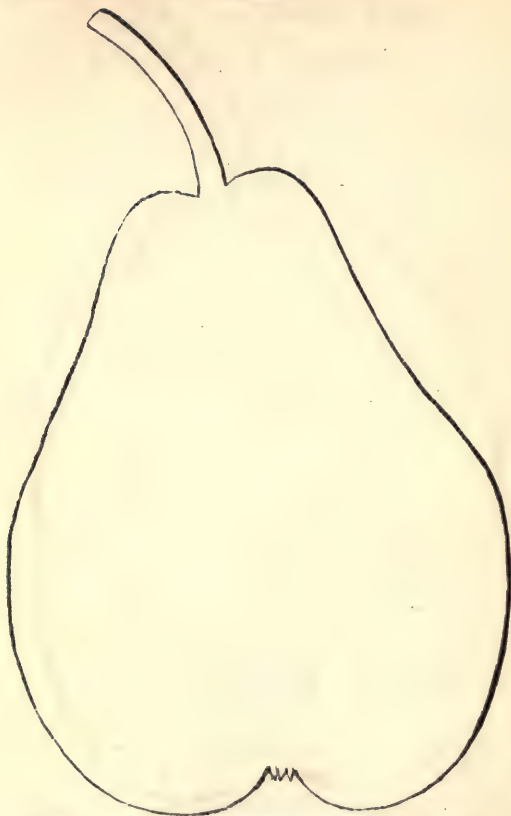
Fruit large, obovate, regular; yellowish-brown, with reddish cheek and numerous gray dots. A pear of mark and excellence, but not yet fully proved with us.

Flesh yellowish-white, melting, and juicy.

Flavor rich, musky, and excellent. Ripens through January. Requires very high culture.

37. CHAUMONTELLE.

Fig. 262.



Tree vigorous, with long, slender, dark brown, flexuous shoots. Requires high culture, and warm soil and locality. At the north succeeds only on the quince. A fair bearer.

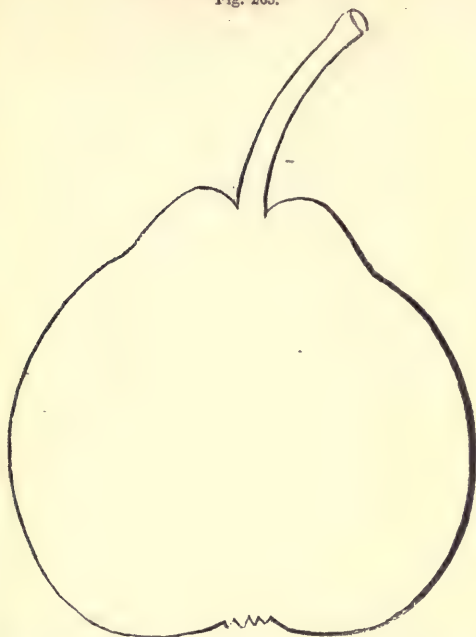
Fruit large, oblong obovate, somewhat variable, rather rough; yellow, with brownish-red on the sunny side.

Flesh melting and buttery.

Flavor sugary and pleasantly perfumed. Ripens from November to January, or later.

38. WINTER NELIS.

Fig. 263.



Tree hardy and thrifty, the young branches light olive, very slender and diverging. A good and regular bearer of fair fruit.

Fruit medium or below, round obovate; yellowish-green when ripe, with much russet.

Flesh yellowish-white, fine-grained, melting, and juicy.

Flavor rich, sugary, and aromatic. The best of winter pears. Ripens in December and January.

39. WINTER BELL.

Tree of strong, erect growth.

Young shoots very dark olive. A good or heavy bearer.

Fruit large to very large, irregularly obtuse or oval pyriform; yellowish-green, with a brownish-red cheek.

Fig. 264.



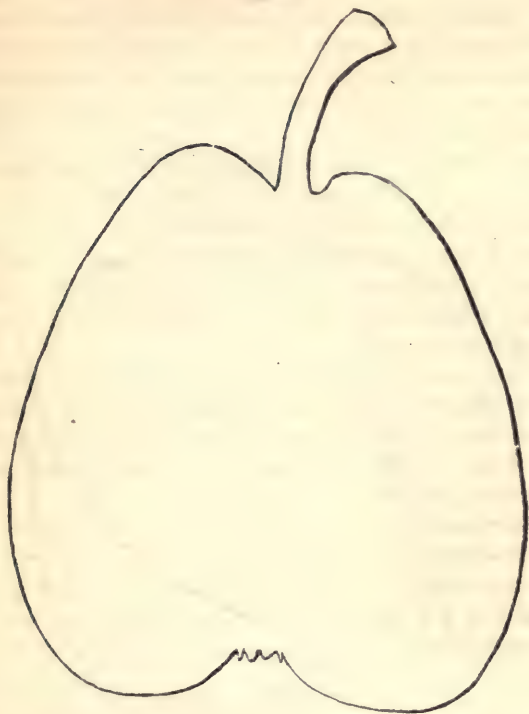
Flesh hard and coarse ; tender and of a reddish color when cooked.

Flavor a rough sub-acid, becoming rich and excellent when baked or stewed. See pages 289, 368.

The Vicar of Winkfield may be substituted for this if it be desired to have a cooking fruit which is also sometimes good to eat out of hand, or that fine old French variety, the Catillac, may take its place.

40. EASTER BEURRÉ.

Fig. 265.



Tree thrifty, erect, forming rather a compact and symmetrical head. Bears well, but requires high culture.

Fruit medium or above, obtuse obovate; greenish, with some spots of brownish russet.

Flesh white, fine-grained, melting, and buttery.

Flavor, when well raised and ripened, fine, sweet, and rich. Ripens from December to May.

The Easter Beurré, in ungenial soils and climates, sometimes disappoints the cultivator by its persistent immaturity.

It should have good soil, culture, and climate, be carefully gathered and wintered as directed p. 368, and ripened in spring.

THE PLUM.

This is a pleasant and rather useful fruit, which every house-keeper wishes to possess, but can not always secure, the varieties which are in a measure exempt from fatal disease or the destructive assaults of insects being so few that, in selecting this fruit, we rather take what we can get than what we might desire. See page 278.

Many different varieties of this fruit are dried, and become articles of commerce in the form of prunes, prunelles (that is, prunes skinned and pitted), and common dried plums.

Plums may be planted at the distance of ten or twelve feet each way; and wherever they can be raised successfully, or in particular seasons when the fruit is perfected, they constitute a profitable market crop.

The trees should be carefully planted while quite young, and the head properly formed and balanced by both winter and summer pruning, many of the varieties having a natural tendency to long growth, which carries the fruit out of reach if pruning is neglected.

A strong loam or a clay soil is thought best suited to plum-trees, although they will grow thriftily even in very light soils; and it may be that a heavy cold clay soil is rather specially unfavorable to the insects which injure them than directly favorable to the fruit.

SELECT LIST OF PLUMS

Numbered nearly in the order in which they will be found to ripen in any given soil and latitude.

The ordinary time of their ripening at New York accompanies the figure and following description. Those marked with a star are green or yellow.

- | | |
|--------------------|--------------------------|
| 1. Ottoman. | *8. Lawrence's Favorite. |
| *2. Hudson Gage. | *9. Washington. |
| 3. Peach. | 10. Lombard. |
| 4. Duane's Purple. | *11. Bleecker's Gage. |
| 5. Schenectady. | 12. Smith's Orleans. |
| *6. M'Laughlin. | 13. Cruger's Scarlet. |
| *7. Green Gage. | 14. Columbian Gage. |

- | | |
|--------------------------|-------------------------|
| *15. Jefferson. | *21. Coe's Golden Drop. |
| *16. Imperial Gage. | 22. Coe's Late Red. |
| 17. Purple Gage. | 23. Blue Imperatrice. |
| 18. Manning's Long Blue. | 24. Frost Gage. |
| 19. Dominie Dull. | 25. Ickworth. |
| *20. Catharine. | |

This list, though so brief, will, it is believed, be found to include most of the really fine and valuable plums we possess, from the earliest to the latest varieties, but it may easily be doubled or tripled, if necessary.

1. OTTOMAN (*Fig. 266*).

Tree a moderate grower and good bearer. Young branches somewhat downy. Fruit rather small; dull yellow, with marblings of a darker shade, and having a thin bloom.

Flesh juicy, sweet, and good, cleaving to the stone. Ripens last of July.

Fig. 266.

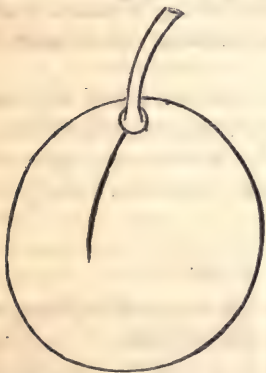
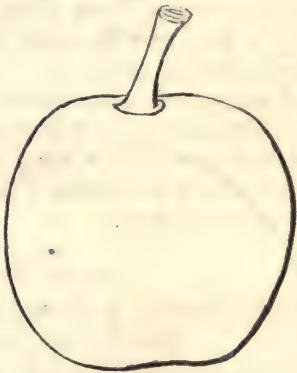


Fig. 267.



*2. HUDSON GAGE (*Fig. 267*).

Tree of free growth and a good bearer.

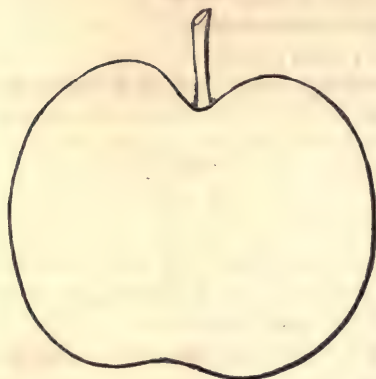
Young branches slightly downy.

Fruit medium; yellow, with streaks of green under the skin, with a light bloom.

Flesh greenish, juicy, melting, and of fine flavor; almost free from the stone. Ripens first of August.

3. PEACH.

Fig. 268.



Tree of rapid and strong growth, and a good bearer.

Young branches of a purple tint, smooth.

Fruit large roundish flattened; purplish-red, with spots of light bronze or russet, nearly covered with a blue bloom.

Flesh greenish-yellow, juicy, and sweet; not fine-grained; a partial free-stone. Ripens in the first half of August.

4. DUANE'S PURPLE.

Fig. 269.



Tree of strong growth; a moderate bearer.

Young branches and leaves gray and downy.

Fruit large, light purple or red, with yellow specks and light bloom. Oblong or oval, one-sided.

Flesh amber-colored, not very juicy, but of fair quality, or rather rich; clings to the stone. Ripens toward the middle of August.

This early and very showy plum is sometimes rather acid, but in favorable seasons good, or first-rate.

It is also valuable as a market fruit.

5. SCHENECTADY (*Fig. 270*).

Tree of fair growth and a free bearer.

Young branches smooth and rather slender.

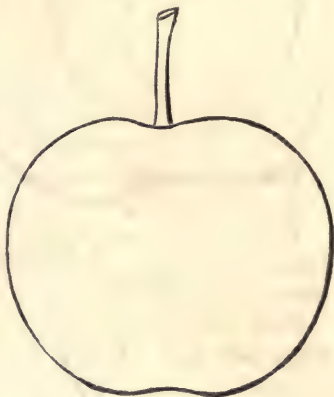
Fruit medium, round-oval ; deep purple.

Flesh greenish-yellow, melting, juicy, and rich. Ripens about the middle of August.

Fig. 270.



Fig. 271.

*6. M'LAUGHLIN (*Fig. 271*).

Tree of strong, free growth, and a good bearer.

Young branches smooth.

Fruit large, roundish, russet-yellow, with red or purplish tint.

Flesh yellow, somewhat firm, juicy, sweet, and rich ; clings to the stone. Ripens about the middle of August.

*7. GREEN GAGE (*Fig. 272*).

Tree of slow growth and dwarfish habit, but a good bearer.

Young branches smooth, with large shouldered buds.

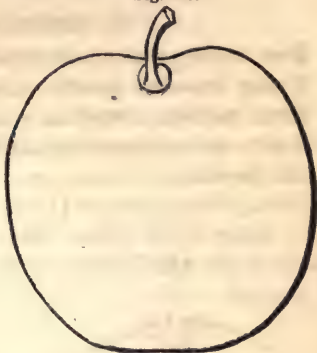
Fruit medium or below, nearly round, yellowish-green when ripe, with slight dottings or marblings of red.

Flesh pale green, melting, juicy, sprightly, luscious ; a free-stone. Ripens about the middle of August. The finest flavored and richest of plums.

Fig. 272.



Fig. 273.

8. *LAWRENCE'S FAVORITE (*Fig. 273*).

Tree thrifty and upright ; a good bearer.

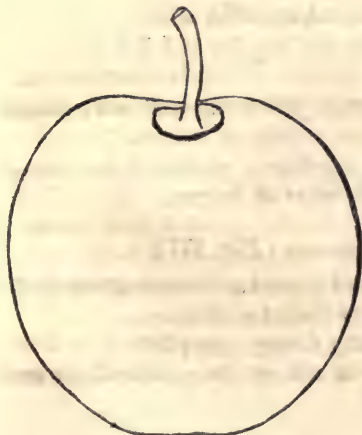
Young branches downy and short jointed.

Fruit pretty large, roundish, somewhat flattened ; dull yellowish-green, with darker streaks beneath, and covered with bloom, and some reddish dots and mottling in the sun.

Flesh greenish, very juicy, melting, and rich ; a free-stone when fully ripe. Ripens about the middle of August.

*9. WASHINGTON.

Fig. 274.



Tree of very vigorous growth and a free bearer.

Young branches downy.

Fruit very large roundish oval, dull yellow marbled with green, and a few reddish dots in the sun.

Flesh yellow, firm, but sweet and good ; a free-stone. Ripens after mid-August.

This fine plum was first fruited about forty years ago by Mr. Wm. Bolmer, a merchant of New York city, and often bears his name.

10. LOMBARD (*Fig. 275*).

Tree thrifty and an abundant bearer, suited to light soils.

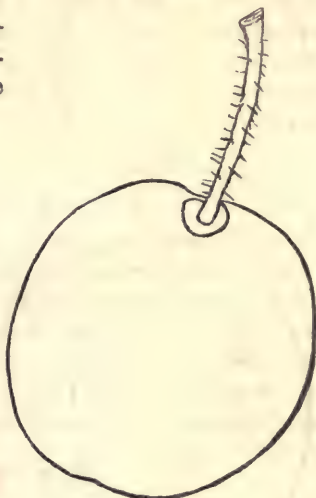
Young branches smooth, bright purple.

Fruit medium roundish oval, a little flattened, pale violet-red, with dots of deeper red, and a thin bloom.

Fig. 276.

Flesh yellow, juicy, and pleasant; clings to the stone. Ripens from the middle to the close of August.

Fig. 275.

*11. BLEECKER'S GAGE (*Fig. 276*).

Tree a good healthy grower, and regular and free bearer.

Young branches downy.

Fruit medium roundish oval, yellow specked with white, and having a thin bloom.

Flesh yellow, sweet, and excellent; almost a free-stone. Ripens from the middle to the close of August.

12. SMITH'S ORLEANS (*Fig. 277*).

Tree extremely vigorous, and a good and constant bearer in all soils, adapting itself also to varieties of climate.

Young branches very slightly downy; purplish.

Fruit large oval, inclining to oblong; purplish-red, covered with a deep blue bloom.

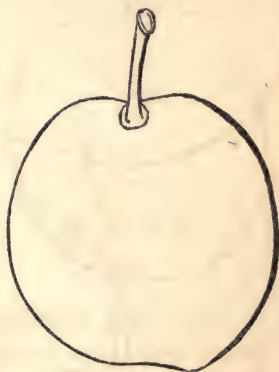
Flesh yellow, somewhat firm, but juicy, sprightly, and vinous; clings to the stone. Ripens toward the last of August.

This plum was raised some thirty-five years ago at Gowanus, Long Island, by Mr. Smith, from a seed of the "Orleans," one of the oldest, if not the very oldest, of our dessert plums, and is named after the originator and the variety from which it was produced. In general, it is the finest of the class of vinous-flavored plums, but on strong cold soils becomes too acid for eating out of hand. Its large size and productiveness, with its general excellence, and the habit of hanging long on the tree, will render it always a favorite and profitable fruit.

Fig. 277.



Fig. 278.



13. CRUGER'S SCARLET (*Fig. 278*).

Tree of free growth, and bearing freely and constantly; it is superior for light soils, being but little subject to injury from the curculio.

Young branches downy.

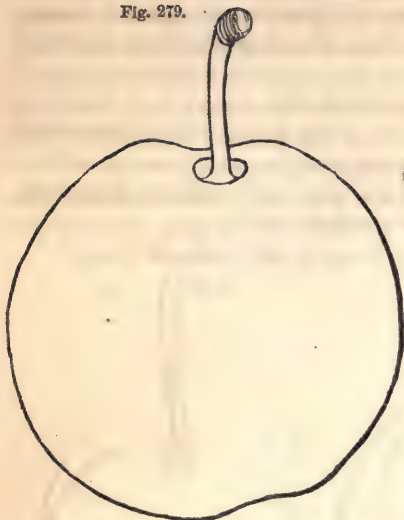
Fruit medium round oval; bright red or lilac, with golden dots and a thin bluish bloom.

Flesh orange, rather dry, of a mild, but lively and pleasant sweetness. Ripens about the last of August, and hangs long on the tree.

It is a valuable market fruit.

14. COLUMBIAN GAGE.

Fig. 279.



Tree of strong growth and spreading habit; a very good bearer.

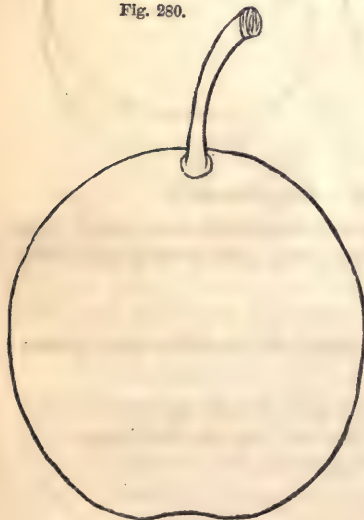
Branches when young, downy; stout.

Fruit very large, nearly globular; brownish purple, reddish in the shade, with many fawn-colored dots and much blue bloom.

Flesh orange, not fine-grained, and somewhat dry, but a fine, rich, sugary fruit when ripe; a free-stone. Ripens about the last of August.

*15. JEFFERSON.

Fig. 280.



Tree vigorous and a good bearer.

Young branches almost smooth.

Fruit large round oval; golden-yellow, purplish-red on the sunny side, and covered with thin whitish bloom.

Flesh orange, very juicy, and richly flavored; almost a free-stone. Ripens about the last of August, and hangs long on the tree.

This plum was raised and named by the late Judge Buel, of Albany.

*16. IMPERIAL GAGE (*Fig. 281*).

Tree of remarkably luxuriant growth, an abundant bearer, and peculiarly adapted to light soils; lacking flavor on heavy ones.

Young branches very slightly downy.

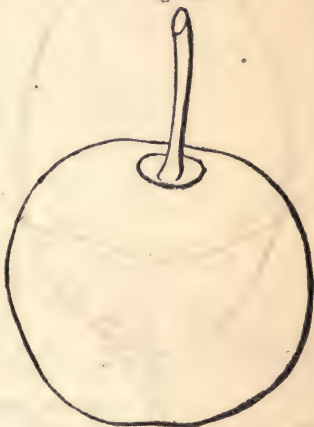
Fruit medium or above; yellowish-green, striped or marbled beneath the skin with darker green.

Flesh greenish, melting, rich, and juicy; almost a free-stone. Ripens about the first of September.

Fig. 281.



Fig. 282.



17. PURPLE GAGE (*Fig. 282*).

Tree of moderate growth, and a good bearer.

Young branches smooth and short-jointed.

Fruit medium roundish; violet, with yellow dots and a fine blue bloom.

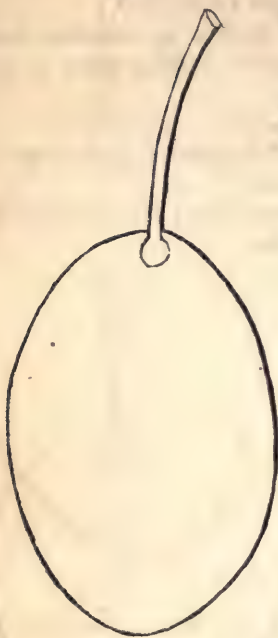
Flesh yellowish, rich, and sugary, but somewhat dry; will hang long on the tree; a free-stone. Ripens through September.

18. MANNING'S LONG BLUE (*Fig. 283*).

Tree of moderate growth, and an abundant bearer.

Young branches smooth.

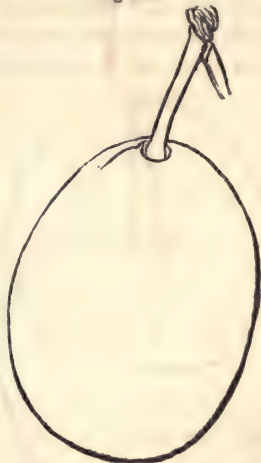
Fig. 283.



Fruit large long oval ; dark purple, with a heavy blue bloom.

Flesh yellowish, moderately juicy, sweet, and pleasant ; almost a free - stone. Ripens through September, or later.

Fig. 284.



19. DOMINIE DULL (*Fig. 284*).

Tree of free but not large growth, and a very good bearer.

Young branches smooth.

Fruit medium long oval ; very dark purple, with a light covering of blue bloom.

Flesh yellow, juicy, sweet, and good, becoming dryer and richer if left hanging on the tree ; clings to the stone. Ripens in all September.

*20. CATHARINE (*Fig. 285*).

Tree of moderate growth, bearing abundantly.

Young branches smooth and somewhat slender.

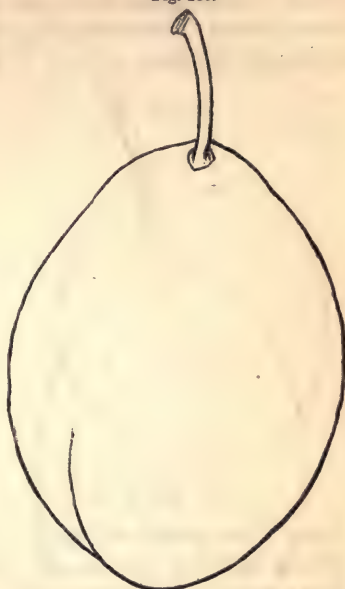
Fruit medium obovate ; pale yellow, with occasionally a reddish cheek, and covered with a thin white bloom.

Flesh yellow, juicy, perfumed, and rich; clings to the stone. Ripens toward the last of September.

Fig. 285.



Fig. 286.



*21. COE'S GOLDEN DROP (*Fig. 286*).

Tree of strong growth and a fair bearer, requiring warm soils and locations if planted north of latitude 40°.

Young branches smooth.

Fruit very large oval, tapering toward the stem; light greenish-yellow, with dark red spots on the sunny side.

Flesh yellow, rather firm, and not fine-grained, but sweet, rich, and sometimes melting; clings to the stone. Ripens about the last of September, and may be left on the tree, or gathered and kept, for some time.

22. COE'S LATE RED (*Fig. 287*).

Tree of free growth and productive.

Young branches downy.

Fruit medium, round, or very nearly so; purplish light red, with a blue bloom; a very desirable late fruit for garden or orchard culture.

Flesh yellowish, firm, juicy, and vinous; almost a free-stone. Ripens through October.

Fig. 287.

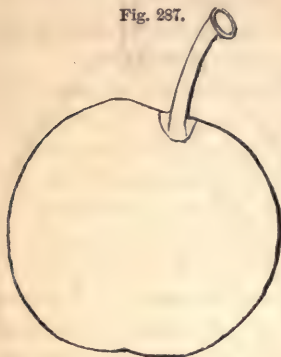


Fig. 288.



23. BLUE IMPERATRICE (*Fig. 288*).

Tree of free growth and quite productive.

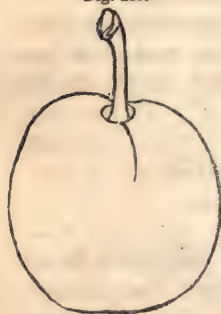
Young branches smooth and rather slender.

Fruit medium, obovate; dark purple, with a heavy blue bloom.

Flesh greenish-yellow, not juicy, but rich and sweet; clings to the stone. Ripens in October, and hangs until November.

24. FROST GAGE.

Fig. 289.



Tree thrifty and an abundant bearer.

Young branches smooth and rather slender.

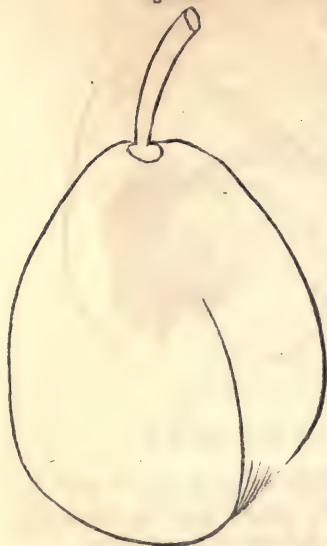
Fruit small round-oval; deep purple, with a fine rich bloom.

Flesh greenish-yellow, melting, rich, and sweet; clings to the stone. Ripens in October, and continues for some time.

This plum, like the damson, is commonly increased by its offshoots. It is not only excellent in quality, but very beautiful upon the tree.

25. ICKWORTH.

Fig. 290.



Tree of moderate vigor and a fair bearer.

Young branches smooth and somewhat slender.

Fruit medium to large, obovate; purple, with irregular tracings of light fawn color.

Flesh greenish-yellow, rich, juicy, and very good, becoming sugary with keeping; clings to the stone. Ripens in October, and may be kept in a dry room for several weeks, or sometimes months, if wrapped singly and carefully in paper.

This valuable late plum is a somewhat recent English variety, usually called Ickworth Imperatrice; but as we have already a "Blue Imperatrice," the latter name is dropped.

THE POMEGRANATE.

The wild Pomegranate of Europe and China is of a sharp acid flavor, but the cultivated kinds are subacid or sweet.

The fruit is of ordinary peach size or larger, and contains numerous red seeds, and a juicy pulp of pleasant flavor, cooling and excellent for use in fevers, etc. It has a tough skin, but its yellow color and red cheek, with its large calyx eye or crown, render it very beautiful. It grows well with less care than the orange-tree in the latitude of 40° north, fruiting freely in Maryland and Virginia, but not ripening its crop with certainty farther north than the Carolinas.

The tree is pretty, having small lance-formed leaves, with reddish veins. It grows about twenty feet high at the most, and bears a profusion of showy scarlet flowers. There is also a double-flowering scarlet variety, which is still more orna-

mental, extensively cultivated as a conservatory or green-house plant in the colder latitudes.

Fig. 291.



a. Branch in blossom.

b. Branch in fruit.

It is well suited with any moderately good soil, though preferring a rather light loam. The plants may be raised from seeds sown as soon as ripened, or by cuttings or layers.

Wherever it will stand out during winter it may form beautiful ornamental hedges, and in some localities might answer for fences.

THE QUINCE.

The Quince is a rough-flavored, astringent fruit, entirely unfit for eating in the raw state, but is a favorite for stewing and making preserves, on account of its fine fragrance and richness. Quince-trees intended for bearing should be pruned to a single but generally low stem, and all offshoot growth prevented.

They may be planted at a distance of eight to twelve feet each way, or between fruit-trees of larger growth, and are suited with a rather moist soil, though with care they will grow in any.

There are quite a number of various kinds of quinces, having the same general character and flavor, but differing chiefly

in the size and fleshiness of their fruit. The common inferior-fruited kinds are often used as stocks for dwarfing pear-trees, but a free-growing variety, known as the Angers Quince, and some others of similar habit, are greatly superior for this purpose. The Japan Quince is an ornamental shrub bearing a small green fragrant, but otherwise useless fruit.

Most of them may be raised from seed, and all are readily increased from offshoots, or by hill or common layering, or by cuttings planted in the fall or early spring and mulched.

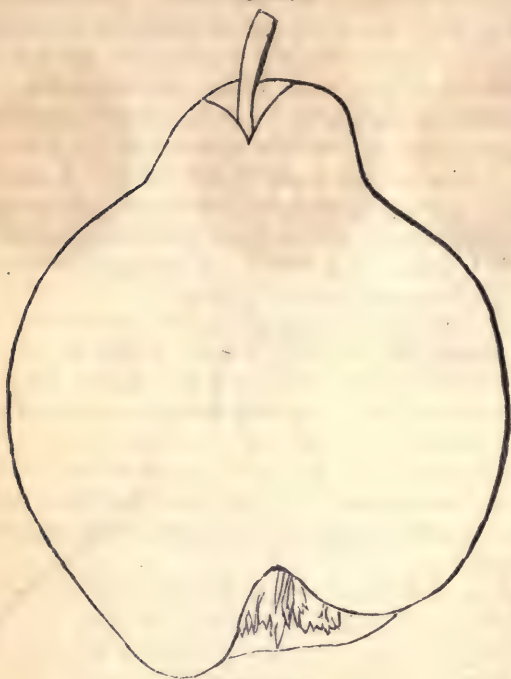
The Apple Quince, Fig. 292 *a*, is a fine golden-colored fruit of rich appearance and superior quality.

Fig. 292, *a*.



The Pear Quince, Fig. 292 *b*, though by no means equal to the former, is extensively raised for market, and is a fruit of fair quality, less tender in cooking than the former, and by no means equal to it, but both are valuable and profitable.

Fig. 292, b.



Pear Quince.

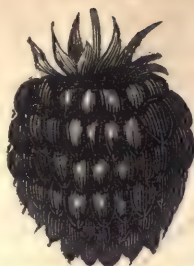
THE RASPBERRY.

There are numerous varieties of this esteemed fruit, of divers colors, almost all being prolific, and most of the red or dark-fruited kinds of good flavor. Perhaps the Red Antwerp and the Fastolff, which ripens rather later, are the finest, but at the north they require covering in winter to secure a crop.

The Franconia is a hardy variety, which bears abundant crops of fruit, scarcely, if at all inferior, when fully ripe, to the Red Antwerp, either in size or quality, having a firmness of texture which renders it valuable for preserving.

Knevet's Giant is a new English variety of good reputation both for quality and hardiness. Some new and promising varieties have also been recently raised from seed.

Fig. 293.



a. Red Antwerp.



b. Fastloff.



c. Franconia.

The most common of the dark-fruited raspberries is the American Black, the red-cane variety which for so many years has been extensively cultivated for the New York market. It is perfectly hardy, and bears abundant crops of rather small but well-flavored, though not first-class fruit.

The double-bearing, of which there are several varieties, yield a partial second crop of fruit of middling character late in the fall, just when peaches abound, and are therefore of no special importance.

The Yellow Antwerp bears a fine, large, thimble-formed berry, and shows well upon the table when mixed with the red, but it also is tender, and has, in common with its inferior varieties, a certain degree of faint sweetness in the flavor that requires mingling with something more acid to make it agreeable. The Orange, which resembles it, is later in ripening, and hardier.

Raspberries should stand in rows six or eight feet wide, the bushes being from two to four feet apart in the rows, according to the habit of the kind planted. The soil can scarcely be made too rich and warm for them.

They require only winter pruning, which consists simply in removing the old dead canes, and shortening the ends of the young shoots, to bring the rampant growers within bounds and strengthen the spring growth, upon which all the fruit is borne. They should be cut back to about four feet high if we desire fine fruit, and, if at all weak, might be pruned still shorter to advantage.

The more moderate-growing kinds of raspberries are often cultivated by tying up the canes of each plant to a single stake, or to a bar fastened along the row of stakes for this purpose ; but the stronger growers, of which the red-cane named above is the most rampant, are usually inclosed by running a single bar along each side of the row, with posts at about six feet apart, with cross braces at proper intervals, making a frame about two feet wide. Within such a frame the bearing shoots and the young strong canes of the current season become mingled and thickened, and the difficulty of gathering the fruit and the labor of winter pruning are much increased.

Let this frame be made three feet wide instead of two ; nail two braces, an inch and a half or two inches apart, upon each pair of posts, putting two such upon each side of every third pair. Let the narrow space between the braces range at a level from end to end of the frame ; into this space, and close upon one side of the frame, introduce a strip of plank two or three inches wide, put a pin through it at each end near to the brace to prevent it slipping out, and fit it so at the third pair of posts that its end will not interfere with the next length. Put in similar strips throughout, and you have a sliding bar along your frame ready for use. Suppose your canes trimmed for the spring of 1858, with the slide-bar resting to the westward of them ; you move it across to the eastward, pressing the canes before it till they are near or rest upon the outer bar ; allowing them such "play" as you may think they require, fasten your sliding bar for the season by pinning it to or notching it into the braces, or in any way you find convenient, and if the canes do not spread evenly along their allotted space, form a sort of rack for them by tacking short pieces of lath here and there. When the young canes shoot up from the root, they will naturally grow upright and apart from the bearing shoots ; but if they should incline toward them, a small strip of board, without sharp edges, or a light bean-pole laid between them and resting its weight upon both, will sway them a little in the opposite direction, and leave your fruit entirely within reach and at command, and prepare the whole mass of old cane for being easily cut away at the next pruning. It remains

only to press the bar westward in the spring of 1859, and so alternate it from year to year.

The chief, if not the only objection to the use of such a frame lies in the reduced amount of shade afforded to the fruit, raspberries and blackberries seldom attaining their finest size when entirely exposed, being also liable to scorch and become imperfect in the full sun. In certain latitudes and soils this may become a serious difficulty, and wherever it is so the stake or single-bar mode should be adopted.

THE STRAWBERRY.

A great number of kinds of strawberries are in cultivation, some of them very large; others that range generally of better flavor, but more moderate size.

There are but two distinct systems of cultivation—the one may be called the hilling, and the other the bedding system. In both systems, so far as garden culture is concerned, the deepest and warmest soil it affords should be selected, and the plants set out in rows twelve to fifteen inches wide, and a foot apart in the row, with a narrow walk between every third and fourth, or fourth and fifth row.

In the hilling system the beds thus formed are kept perfectly clear of weeds, and all runners from the plants are cut off as soon as they start.

Under this course of treatment, the plants, instead of over-running the bed, form large branched or multiplied crowns, from which, in its season, the fruit is produced—finest and most abundantly in the first full-bearing year, afterward gradually declining, until in four or five years, at most, the beds must be replaced by others. An annual top-dressing of compost is applied after the crop is gathered, being lightly dug in with the spade-fork.

After the spring hoeing of such beds they are carefully mulched by laying straw, or litter, or tan, or moss between the rows, so that the fruit, when bent down by its own weight or from dashing rains, will not become dirty and unfit for use. For this purpose, a coat of cut straw, such as is commonly fed to horses, etc., will be found excellent and easily applied.

In the bedding system less labor and care are required, provided they be given at the proper time.

The beds should be annually renewed in the following manner :

At the ends of the rows, when first planted, set a small locust, or chestnut, or cedar stick, thrust into the ground to the depth of a foot or more. If your bed is planted in early spring, or even at any time before the middle of June, and well tended, being hoed often and carefully till they begin to run, and afterward hand-weeded if requisite, and all runners that would spread themselves into the paths cut off or turned in, the whole surface of the bed will be covered before winter with strong young plants ; the crowns of the parent plant, instead of branching immediately around itself, as in the hilling system, will have spread and planted themselves at a distance in independent positions. In the following spring the bed will yield its crop in season, and the mat of leaf-growth upon it will keep the fruit clean.

As soon as the crop is gathered, begin on one side, and find by your mark-sticks where the old rows stand, and stretch a line exactly midway between the first two of them, from end to end of the bed ; then, with a spade or grass-edger, cut along each side of the line so stretched, at two inches distance from it, proceeding thus until you have gone over the bed, dividing it into four strips of about eleven inches width, in which the old-plant rows stand, and three strips of four inches, occupied exclusively by young plants. If, on looking at it, you think you would prefer to have five rows in your new bed rather than three, though the latter is generally preferable, make another cut along just outside of each old outside row, and you will have a narrow rim of young plants standing on each side of your bed.

If you wish plants for enlarged plantings, you may pare off with your spade, an inch or two deep, all the *wide* intervals, and can choose out the young plants for resetting as you may desire, or the plants on the wide spaces, instead of being pared off, may be dug under if they are not needed for use, thus retaining them in the bed as specific manure for their successors,

adding compost also in the process. If pared off, fill up the spaces with leaf-mould or compost, and either dig them with the spade-fork or hook them over deeply with a potato-hook; then let the narrow strips of young plants be well hoed and perfectly cleaned from weeds and grass, and you will leave the whole bed as clean and loose as when it was just planted, but with a better stock of plants, and these undisturbed and ready to grow right on. Place your mark-sticks at the centre of the ends of your new rows, and keep the bed clean as before until the runners cover it again preparatory to your next crop; and so alternate from year to year, manuring with compost, etc., as may be needful, at the annual renewal of the bed.

This mode, though it may at first appear complicated, is really a simple and efficient process for securing a clean and, with proper precautions, a full-cropping strawberry-bed at a small expense of labor.

Dress your bed repeatedly through the summer and fall with leached ashes and liquid manure. Give it a *very* light winter covering of straw or evergreen. Let it have at least one liberal application of liquid manure at the opening of spring; and, if drought occur while the plants are in blossom or fruit, water them often and heavily to such a degree as will prevent their becoming sensible of want of moisture.

Upon beds so treated the fruit will prove to be almost uniformly fine; plants seldom yield fruit equaling, and never surpassing, the product of their second year, and by this system every bearing plant in your bed comes within this class.

In large operations for marketing, the strawberry crop is sometimes brought into the system of farm rotation, upon this alternating or renewal principle. New acres are planted every spring, at from two to three feet distance each way, the land being well manured, and furrowed as for corn, and the plants set at the crossing; they are kept clean with the cultivator, or with the plow and drill-harrow, and a little hoeing until they begin to run. Before winter they cover the ground; and, as soon as the crop is marketed in the following spring, the whole patch is plowed under, and a fall crop of vegetables planted on

the land. If the plantings are made in the fall, which is undesirable, the patch runs over to the spring of the third year for its main crop.

Difficulty, and not unfrequently disappointments, are met with in strawberry culture from the irregular botanical peculiarities of the blossoms. Unless skilled in these, so as to discriminate clearly, it will be well that you should watch your bed from year to year, and destroy all plants that bloom, but fail to fruit; for, if this be neglected, they will, after a while, conquer the less vigorous fruit-bearers, and spoil your bed.

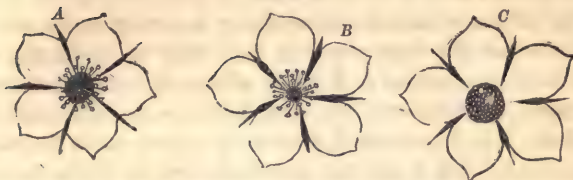
Naturally the blossoms of most varieties of the strawberry, like those of the apple and cherry, or, more strictly, like those of the raspberry, are bi-sexual and perfect, combining stamens and pistils in due proportion in the same flower; but in certain kinds, the flowers, or most of them, are imperfect, some varieties lacking pistils, and others being destitute of stamens, so that fruit is not produced. The whole family of HAUT-BOIS, or high-stem strawberries, known by their pyramidal heads and crimped foliage, is peculiarly subject to these defects; and, although their fruit is of a remarkably fine, high flavor, they have failed to make their way into general cultivation.

Peabody's new Haut-bois, which was said to be an exception to the rule, "having perfect flowers, bearing well, and retaining the peculiar flavor of its class," has failed to justify the encomiums of its venders.

Much has been said and written by way of obviating the difficulties resulting to the private cultivator from these imperfections. The best general remedy is to throw away all such kinds, or leave them to professional fruit-growers or special amateurs, and obtain plants of perfect-flowered varieties that may be relied on alone for a fair or abundant crop. There is probably no kind with defective flowers so superior to others in the character of its fruit as to make it worthy of continued cultivation by those whose general duties are likely to interfere with any small attentions to such a matter, or whose time and labor are deemed of value; and as new and excellent varieties of the strawberry are readily produced from seed, the range for such selection is constantly enlarging.

STRAWBERRY BLOSSOMS.

Fig. 294.



- A. Perfect or bi-sexual blossom, having stamens and pistils in due proportion.
 B. Imperfect staminate blossom, having stamens, but lacking pistils.
 C. Imperfect pistillate blossom, having pistils, but lacking stamens.

A. Plants bearing perfect or bi-sexual flowers, as Fig. 294 A, are always fruitful, but more or less so according as they produce their stamens and pistils in sufficient or insufficient proportion to one another. These varieties are very commonly, but quite improperly, called staminate, or by another designation, which, as applied to fertile plants, is simply absurd.

B. Plants bearing only staminate flowers, as Fig. 294 B, are uniformly and entirely fruitless.

C. Plants bearing pistillate flowers, as Fig. 294 C, are fruitless, unless in combination with plants bearing perfect flowers, as A, certain varieties of which have stamens in excess; or with plants bearing only staminate flowers, as B, in connection with which they may be regarded as anomalous dioecious varieties (see page 76). In such combinations they are very fruitful, and some of the finest known varieties are of this class, or belong to a subdivision of bi-sexual flowers in which a deficient proportion of stamens is developed, and, consequently, when planted alone, they yield but little fruit, and are therefore also sometimes erroneously called pistillates.

COMBINATION OF CLASSES.

If it is desired to cultivate such kinds on account of special qualities in the fruit, the end may be readily secured by planting your beds of only three rows width, leaving a space of three feet between the beds, and along the centre of this space planting a single row of any good perfect-flowered variety, which

must be either cultivated upon the hilling system or limited to its own space by running the grass-edger, or a substitute for it, along each side of it from time to time, cutting off and removing all runners, and maintaining a perfect separation between it and the beds; or the beds may be made five rows wide, the centre row of each being of a perfect-flowered variety, and kept apart from the others with the grass-edger, as above directed. The blossoms of these will supply the deficiency of fertilizers in your beds, and secure full crops. The following kinds are of reputation in their several classes.

Either of the varieties comprised in the first of the following classes may be planted as fertilizers in combination with those of the second, but perhaps No. 1 or No. 3 will prove as desirable and successful as any for the end sought.

CLASS I.

Varieties having perfect or bi-sexual flowers, bearing their full natural crop of fruit when planted alone. Sometimes wrongly called staminate.

NO. 1. LARGE EARLY SCARLET.

Fig. 295.

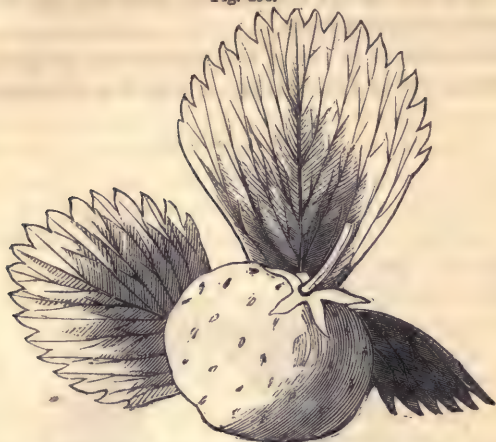


Pretty large, round ovate; tender and rich. Color a fine bright scarlet. A good bearer, and ripens early.

This is an improved sub-variety of the old or native early scarlet, and very superior to it in all respects.

NO. 2. LONGWORTH'S PROLIFIC.

Fig. 296.



Rather large ; dark crimson ; roundish ; flesh firm, subacid, rich, and high flavored. It is a regular and free bearer, carrying its fruit well upon the stem. Ripens at medium season.

NO. 3. WILSON'S ALBANY.

Fig. 297.

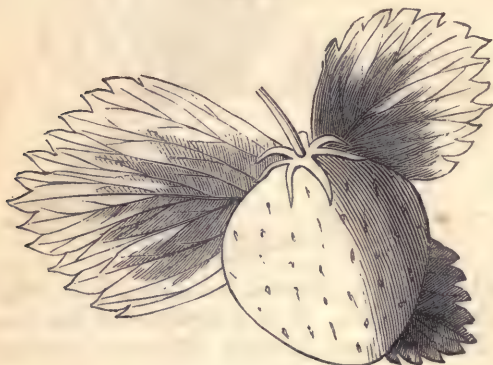


Large to very large ; roundish-conical, form varying with the size, as in the figures. Color dark ruby. A strong grower, very productive, and of excellent quality. Ripens at medium season or rather later.

Wilson's Albany is one of the most recent and valuable of strawberries, and is fast making its way to merited popularity.

NO. 4. GENESEE.

Fig. 298.



Large, roundish, slightly necked ; of good quality, and fine appearance. Color dark crimson. Very productive, and carrying its fruit finely on the stem. Ripens late.

To this class may be added Iowa, Walker's Seedling, a fruit of much merit, Ross's Phoenix, and Jenny Lind, all of which, in suitable circumstances, will be found productive and of fine quality.

The Iowa has been extensively used in combination as a fertilizer at the West.

CLASS II.

Varieties having imperfect or uni-sexual flowers, being deficient in stamens or destitute of them ; comparatively unfruitful alone, but bearing abundantly in combination with varieties having either perfect or staminate flowers.

NO. 5. BURR'S NEW PINE (*Fig. 299*).

Large, roundish-conical ; tender, sweet, rich, and aromatic. Color a clear pale red. Ripening early, and in combination bearing fine perfect berries.

Fig. 299.

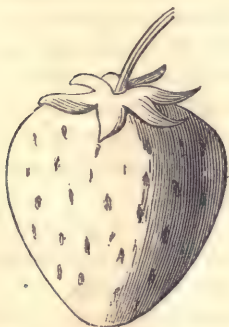
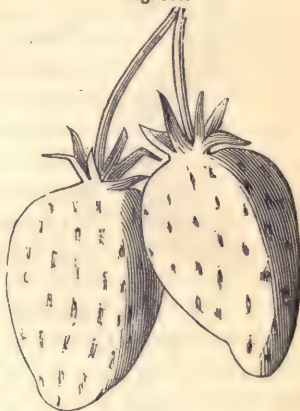


Fig. 300.

NO. 6. CRIMSON CONE (*Fig. 300*).

Pretty large, long conical, with a neck, so that the fruit may be gathered without stems. Sprightly, rich, but slightly acid. Color bright crimson. Ripens rather early.

NO. 7. HOVEY'S SEEDLING.

Fig. 301.

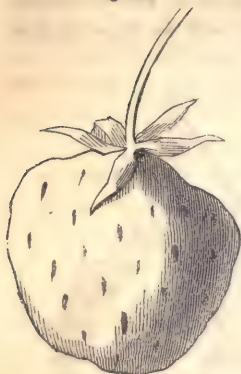
Very large, round-oval, or nearly conical ; firm, sprightly, and in favorable circumstances rich. Color fine dark red. Ripens at medium season or rather later.

This fine strawberry, raised in Boston by the gentleman whose name it bears, has attained, perhaps, a greater celebrity than any other fruit of its class. In proper combination it yields very largely.



NO. 8. M'AVOY'S SUPERIOR.

Fig. 302.



Very large ; irregular and variable ; mostly roundish sub-conical. Tender, juicy, rich, and high flavored. Color dark crimson. Ripens at medium season or rather later.

This rather uncouth fruit originated in Cincinnati about ten years ago, and is the largest of the numerous new varieties which the West has furnished. It has a somewhat coarse and open core, though otherwise excellent in quality, but is too tender to bear transportation to a distant market.

To this class may be added Monroe Scarlet, Moyamensing Pine, Burr's Hudson (Rival), and Jenny's Seedling.

All the foregoing varieties of the second class are partially fruitful alone, but none of them crop fully except in combination with fertilizers.

CHAPTER XXI.

Flowers, Shrubs, &c., of various Classes.—Propagation of Flowers, &c., by Cuttings, Layers, Budding, and Grafting.—Soils and Composts for Flowers.—Select Lists of Flowers of various Classes.—Treatment of Plants in House and Green-house, Heating Apparatus, &c.—Select Lists of hardy Shrubs, Roses, Climbing Shrubs, Evergreens, Shade-trees, &c., with Directions for their Propagation and Culture.

FLOWERS, SHRUBS, ORNAMENTAL TREES, &c.

THE variety of flowers, shrubs, &c., is so very large and so constantly increasing that only the most limited selection from each class can be given, and of these the prettiest and most easily cultivated kinds, not likely to disappoint any reasonable expectation, have been preferred for the subjoined lists, none being excluded because they are old, nor inserted merely because they are new.

A large proportion of each class, except the bulbous roots, are natives of our woods, and swamps, and prairies, and mountains. I would gladly have introduced more of them, but the limits of my work forbade. A good collection of American trees, plants, and flowers is a desideratum worthy even of national attention and effort. Perhaps the city of New York will do herself the honor of at least a beginning in this direction in the arrangement of her new Central Park.

In the selections presented the amateur will probably mark omissions which even limited space might not have induced him to make, and certainly he will be able to make large additions to them of admired plants.

Previous to the outlay of labor and care on a plant, it is almost always desirable to be personally acquainted with it. Many are found in collections and catalogues that are of a negative character, and unworthy of a place in the private flower-garden, however they may interest the botanist or the amateur collector. There are also some of which the name has been their only "ticket of admission," as "*Love in a Mist*;" and others which, though showy, have some capital defect, as the offensive odor of the *Cleome*, or *Spider-flower*.

In general we cultivate flowers for their beauty, but tastes differ, and we do not always agree in the use of terms, or define them clearly. Beauty may be either simple or composite. There is beauty of form irrespective of other elements, as a curve—the rainbow without its colors; there is beauty of color, as the Tyrian purple, or the azure of a cloudless sky; there is beauty of texture, as in the soft satin; but a flower, to be beautiful, must combine beauty of form, color, and texture, and, lacking either of them, it ceases to be beautiful as a flower. It may be of beautiful form, as a plaster rose; or of beautiful color, as a painted cheek; or of exquisite texture, as the eider down; or, farther, it may also be curious in its parts, as the *Fly-trap*; or admirable in its arrangement, as the *Pitcher-plant*, but it is not a beautiful flower. If, however, a flower possess these elements of beauty, its beauty may be heightened by the variation and multiplication of one or more of them. The numerous and varied curves in the Cupped

Rose and the Meadow Lily add greatly to the beauty of the first, and give to the last its peculiar elegance; the varied shades or mingled stripes of color in the Tulip and the Carnation give them their power to excite enthusiastic admiration, and make men "tulip-fanciers," &c.; and the varied texture of the Iris and many other flowers adds sensibly to their beauty.

But in choosing flowers for cultivation, we take some that are not beautiful, because they are showy, and others because they are fragrant, and still others because they come so early in the spring as to afford us the first substantial assurance of its return, or so late in the fall as to postpone somewhat the thought of winter.

In treating this ornamental department of gardening, the following divisions may be named and defined:

BULBS, among which some tuberous roots, as the Anemone, &c., are commonly placed, are a class generally yielding flowers of fine color and texture, and some of them excellent in form.

ANNUALS are such as either naturally blossom and bear seed and die within the compass of a single year, or are so classed in northern climates because the winter kills them. All these, however, may be made, in a sense, biennials, by sowing them late and wintering the young plants for next year's blossoming; while some of them, as the Mignonnette, become perennial if propagated from cuttings and not permitted to ripen seed.

BIENNIALS are such as either naturally form the young strong plant one year, and blossom, bear seed, and die the next, as most garden vegetables, red clover, Canterbury Bells, &c.; or they are those of which the young plants will bear the cold of winter, but the old plants will not, as certain kinds of Pinks, Snap-dragon, Sweet Scabious, &c. These also may generally be made triennial or perennial by preventing the production of seed, and renewing them by cuttings or layers.

PERENNIALS, commonly known as herbaceous plants, are such as have not woody stems, and in climates too cold for their constitution die down in the winter, but spring up every year

from the same root. Thus the *Chriseis Crocea*, formerly *Esscholtzia Californica*, is ranked in New York as an annual, but in Southern California it is herbaceous and perennial.

GREEN-HOUSE PLANTS, sometimes also called pot plants, are such as in northern climates require more or less of artificial heat and house protection to carry them through the winter, and, in general, a return for this trouble and care is sought in the flowers they are made to yield at that ungenial season.

SHRUBS are the smaller class of woody plants, some of them valued only for their foliage, as the Box; others for their flowers, as the Rose; and still others, as the *Cydonia Japonica*, both for flowers and foliage.

CLIMBERS, to whatever class they may belong, climb either by winding, as Morning-glory and the Bitter-sweet; or by clinging with their tendrils, as the Pea and the Grape-vine; or by striking their roots all along as they run, even into a brick wall, as the Virginia Creeper and the Trumpet-flower. Those climbers which are of woody growth are really shrubs, *i. e.*, small trees, of peculiar habit. We have therefore called them Climbing Shrubs.

EVERGREENS are such shrubs or trees as do not lose their leaves in winter, whose greenness cheers that season and links it with its kindlier sisters, though sometimes, in dense masses, deepening its gloom. The lowly *Epigæa*, or trailing *Arbutus*, and the tall-growing hemlock, are of these.

SHADE TREES are either fruit or forest trees when used for the purpose of shade, but generally the latter only are intended.

ORNAMENTAL TREES AND SHRUBS are such as may be chosen from either of the foregoing classes to beautify and form part of the surroundings of a home.

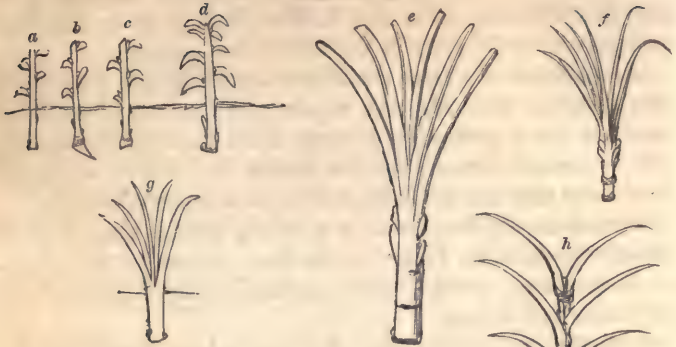
PROPAGATION OF FLOWERS, SHRUBS, &c.

BY CUTTINGS.

GREEN-HOUSE AND HERBACEOUS CUTTINGS.

Cuttings of woody plants of small growth, as green-house and ordinary herbaceous plants, are made in the same manner as those of large woody growth, except that they are usually in leaf when the cuttings are taken off. See the following figures.

Fig. 303.



- a. Common cutting of small woody growth.
- b. A slip cutting of the same, with the butt untrimmed.
- c. A slip cutting trimmed for planting.
- d. A common herbaceous cutting.
- e. A cutting of Carnation or Picotee.
- f. A cutting of the smaller, or garden Pink, made with the knife.
- g. A pink "piping," made by drawing out, without using the knife.
- h. The pipe or tube from which the piping has been drawn.

The Carnation and Picotee are commonly layered, but cuttings may be made, as Fig. e, and are to be preferred. The smaller, or garden Pink, is usually raised from cuttings, as Fig. f, but these are also often made without the knife by simply pulling out a sufficient length of the heart growth, while the lower or stem end of the shoot is held firmly between the thumb and finger. If dexterously done, the cutting will separate precisely at the joint, and is at once ready for planting, Fig. g. This is called "a piping," because, when drawn out, it leaves a pipe or tube formed by the bases of the two next lower leaves which enfolded it, Fig. h. Branch cuttings of all kinds may usually be planted at a depth equal to one half of their length, but cuttings of Carnations, Pinks, and a few other varieties of peculiar growth, are planted so as to bring the bases of their untrimmed leaves just into the surface of the earth. A very little experience and observation will enable the cultivator to judge at once of the proper depths from the size of the cutting and the character of the particular variety. Cuttings that are planted in a sloping position are thought to root more readily

than upright ones. When planted in pots, they should be placed around the inside of the pot, and *in contact with it*, in which position they root more certainly.

All cuttings take root more promptly and freely if so arranged that the soil in which they are planted becomes warm, which is effected by placing the bed over a flue, or by preparing a hot bed for the purpose. If, therefore, a green-house is built and heated as shown page 475, a bed for cuttings may be made immediately above the boiler, so arranged as that the steam will pass under its whole length.

Very fleshy cuttings, as the strong-growing scarlet Geraniums, the Cacti, and some others, are benefited by having their cut parts dried a little before planting. They are akin to air-plants, and may be left sometimes for weeks upon the surface, and still live. These should never be covered closely, but the harder and more woody cuttings, particularly those having fine foliage, as the Fabiana, the Myrtle, &c., are greatly benefited by covering them with glass, to prevent rapid evaporation, lifting the cover occasionally so as to afford air, and, if mouldiness be indicated upon the cuttings, tilt or raise it at the edge, that they may have a constant supply. All plant cuttings should be potted singly as soon as the young roots are well formed; if this is neglected, they must be carefully trimmed at potting, as directed for larger trees. Shade and warmth, and careful watering for a few days after removal, until they fairly restart, will be found essential to all cuttings or plants.

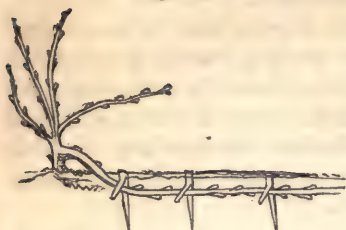
BY LAYERING.

Almost all ornamental shrubs, &c., may be increased by layers, as noted under each. In general, the layering is performed as directed page 199, but there are some to which peculiar modes are applicable, as Chinese layering, American span layering, &c.

These latter processes are of comparatively recent use with us, and have but a limited range of adaptation. All very free-rooting varieties, whether runners or otherwise, may be increased by the Chinese mode; but American span layering is adapted only to luxuriant runners, as grape-vines, Wistaria, &c.

CHINESE LAYERING.

Fig. 304.

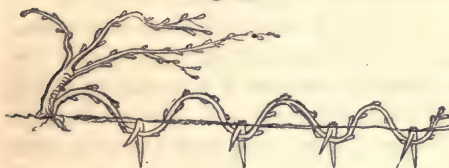


cord or wire between the joints.

In the process known by this name, a young shoot is pegged down flat at its length, and covered about two inches deep, each bud being expected to form a plant, which they often fail to do, though perhaps this defect might be remedied by pretty tight constriction with

AMERICAN SPAN LAYERING.

Fig. 305.



also been used by others, and is always found completely successful. It is performed by pegging into the ground a single joint every foot or eighteen inches, curving the shoot upward between each two layers. Each layered joint may be tongued or not, according to the kind of plant under treatment. This mode is applicable only to running plants, but ten or a dozen layers may be readily made by it from a single pretty long shoot of such as are suitable.

This is a somewhat new process, first practiced, so far as he is aware, by the author, though he has learned recently that it has

HERBACEOUS HILL LAYERING.

Hill layering, so far as applicable to fruit-trees and woody plants in general, has been described page 200 ; but this mode is peculiarly adapted to the propagation of those plants, as Pinks, &c., which do not make long shoots, or which require tonguing, but are too brittle to bear bending. In these cases a dished hill of good earth is made entirely around the plant, and the tongue of the layer is made on the under side of the

Fig. 300.



sprout, which, being strained off a very little from the plant, is bent and pinned down just enough to open the slit and set the tongue bud fairly in the soil, and allow of covering it about one inch and a half deep. See Figure. The hill should be carefully mulched, and watered regularly at evening until the layers are rooted.

BUDDING AND GRAFTING.

Various fancy forest trees and shrubs are budded or grafted, grafting being generally preferred for these, perhaps without good reason. For the mode of grafting, see page 229.

The lighter-growing kinds of Cactus are often grafted upon, or rather planted in those of stronger growth, by a simple yet curious and successful process. Stocks of suitable strength are raised from cuttings, which root readily if planted in sand after being cut a day or two. The graft is dressed to a thin but quite short wedge; the stock is cut off, and the graft wedge set into the heart of it, in a slit made with the point of a knife, or a bone or wooden wedge, the sides of the stock remaining uncut, and, instead of binding, a small wooden skewer, or a long, slim thorn from a large cactus is then passed through the stock and graft, pinning the latter to its place. In a short time the graft (really the *cutting*) throws its roots downward through the substance of the stock, and grows finely.

The operation of budding ornamental trees, as well as oranges, &c., among green-house plants, is performed in the common mode, described page 220. Roses also are budded precisely as fruit-trees, except that some extra care is required in the operation, on account of their comparative smallness, their thorniness, and the softer and more stringy nature of their bark.

All the autumnal and ever-blooming classes of roses, if budded early in the summer, may be made to grow and blossom in the course of the same season by cutting the stock down, at the time of budding it, to within four or six inches

of the bud's place, and carefully suppressing the young stock growth.

SOILS FOR FLOWER COMPOSTS, &c.

GOOD LOAM, among the cultivators of flowers, means such as is of a rather dull yellow, not reddish, and, when moderately dry, cutting with a certain cheesy softness, yet friable when thrown up with the spade, breaking into rather coarse granules, a lump, when broken, showing the same structure, yet not clayey or liable to bake hard after rain. The finest, sweetest pasture grows on such soil. If, however, your loam is more sandy, reduce the sand or peat in the compost you prepare with it.

LEAF-MOULD, as its name imports, is the black earth formed in woods, and along fences, and in corners by the annual decay of fallen leaves. In general they should be left to enrich the forest trees from which they fell, but when decayed the mould forms a most valuable element of flower composts.

PEAT is vegetable matter accumulated upon an uncultivated level surface by the long-continued growth of successive seasons upon the decaying product of their predecessors, in which state it has a mixture of sand; or it is the mass of vegetable matter found in bog meadows and swamps, so compacted and drained as to be readily cut into blocks and dried for fuel. In its wet state it is known as swamp muck.

Road-wash is the deposit of sand and gravel made by the running road-gutters wherever the water may find a place to rest long enough to permit its settling, and is valuable upon all strong soil, and especially so for flower composts.

Sand may either be road-wash, where it is sufficiently free from earth, or it may be common white or silver sand, or ordinary clean, sharp mortar sand, not too coarse.

In preparing composts for flowers, the loam and sand or road-wash may be fresh from the surface, but all manures used should be from one to two years old, and thoroughly reduced by turning, chopping, and mixing.

The manure of spent hot beds is generally used for this purpose, but in composts for certain kinds of flowers, sheep manure, and blood, or other animal matter, are supposed to be valuable.

Peat and swamp muck for these should also be sweetened by exposure and frequent turning over for a year or two before using them.

A pretty deep and rather sandy loam, moderately rich, will suit almost every cultivated variety of hardy flower, shrub, and tree. A few exceptional cases may be found.

FLOWER COMPOSTS.

Composts are prepared for particular plants in order to raise them in perfection where the natural soil is unfavorable, or to produce some special effect upon the plant or flower; and inasmuch as this is often attempted upon a mere notion, composts become as numerous as fancy cultivators.

The following, it is believed, will meet all ordinary demands.

NO. 1. PLANT COMPOST.

- 2 parts of good surface loam.
- 2 " leaf-mould or peat.
- 2 " spent hot bed or stable manure, perfectly rotted.
- 1 " road-wash or sharp sand.

Let these materials be thoroughly chopped and mixed together, and if the manure was properly rotted beforehand, the compost may be used in a week, being again chopped and mixed in the preparatory process. Almost every variety of plant will thrive in it.

NO. 2. LAYER AND CUTTING COMPOST.

- 2 parts of good loam.
- 2 " leaf-mould or peat.
- 2 " rotted manure.
- 1 " road-wash or sharp sand, screened.
- 1 " charcoal dust.

To be chopped and mixed as directed for No. 1.

Almost any cutting or layer will root and grow in it. A few species of hard-wood green-house plants require for their successful propagation by cuttings that these be set under a bell-glass in almost entirely clear sand. Rather coarse white or silver sand, fine road-wash, or ordinary sharp bank-sand may be used. The latter particularly, if much colored with loam, should be washed before use, and at discretion one twentieth

part of leaf-mould may be added to it, and the same quantity of fine charcoal-dust. As soon as cuttings so planted take root, they should be potted, the sand being shaken clean from their roots in the process.

NO. 3. BULBOUS ROOT COMPOST.

- 4 parts of leaf-mould or peat.
- 4 “ well-rotted cow manure.
- 4 “ road-wash or clean sand.
- 2 “ good surface loam.
- 1 “ poudrette.

Let it be thoroughly mixed a week or more before using it. See Tulips, page 449.

NO. 4. FLOWER COMPOST.

- 4 parts of good loam.
- 4 “ leaf-mould or decayed wood.
- 4 “ perfectly rotted cow or sheep manure, or slaughter-house manure.
- 2 “ road-wash or sharp sand.
- 1 “ poudrette.
- $\frac{1}{2}$ “ old wall-plaster, or $\frac{1}{4}$ part fresh-slaked lime.

Add salt in the proportion of a pint to ten bushels of the compost. It should be prepared a month or two beforehand by repeated and thorough turning and mixing. It is calculated for any variety of fancy flower which it is desired to raise of extra quality.

NO. 5. ROSE COMPOST.

- 4 parts of good loam.
- 4 “ well-rotted manure from spent hot bed or the barn-yard.
- 4 “ peat.
- 2 “ poudrette.
- 1 “ road-wash or sand.
- 1 “ guano carefully sifted.

All roses will be found to grow and blossom finely in this compost, prepared by thorough chopping and mixing a few weeks or months before it is used.

FLOWERS.

In describing the various classes of flowers, &c., those only have been called hardy of which, at least, young strong plants will bear an ordinary New York winter with a very slight protection, or without any. All others should be sown or planted in spring, and where necessary, as noted, must be started in the house or a hot bed.

TRANSPLANTING FLOWERS.

All bulbous roots that it is found necessary or desirable to transplant should be taken up as soon after flowering as the plant leaves begin to die, and either replanted or dried and kept for fall planting; and all those which it is not intended to transplant should be perfectly cleared of grass and other weeds in the fall, receiving such dressing as they may require, and thus be prepared for their early spring movement.

Annual and biennial flowers, while small, may be transplanted by removing them with the point of the garden trowel, or with a piece of shingle, taking a little earth with them; but if it is found desirable to transplant them when large, a spade, or two trowels, or the flower transplanter must be used. See p. 52.

Perennials from seed or cuttings may be removed in the same manner at any season; but their large roots should be divided, if at all, soon after they cease flowering, or in the spring just after the growth of the season has commenced, the plants being watered and shaded, if necessary, until they re-start. Greenhouse plants may be removed at any time, but the main annual pruning and repotting should be done in August or September.

Those who cultivate only out-door flowers are sometimes perplexed by the difficulty of so grouping them as to have a succession of various blossoms sufficiently numerous to make a show in the garden or furnish a bouquet for the parlor. This may be secured by setting out, in spring, Verbenas in their numerous varieties, wintered for this purpose, with the double Feverfew, or Lafayette Daisy, the *Salvia Splendens*, *Gaillardia Picta*, *Petunias*, Sweet Alyssum and *Mignonnette*, either wintered or raised early in hot bed, with some other kinds that

bloom freely and constantly. These, added to a small number of well-managed autumnal and ever-blooming roses, and the ordinary annuals, particularly *Portulacca* and *Schizanthus*, and some biennials, as *Sweet Scabious* and *Larkspurs*, will make the garden perpetually gay.

As a farther aid to this end, I have inserted the following list of trees and shrubs, perennials and biennials, bulbous and tuberous roots, &c., which, with ordinary treatment in the open ground, and in similar soils and latitudes, nearly correspond in their times of blossoming, and follow and interlink with one another almost in the order in which they are given.

LIST.

TREES AND SHRUBS.	PERENNIALS AND BIENNIALS.	BULBS, TUBERS, &c.
Mezereum.	Blood-root.	Snowdrop.
Scarlet Quince and } Forsythia. }	Columbines.	Crocus.
Magnolias.	Dielytra and Dwarf Iris.	Persian Iris, &c.
Flowering Almond } and Currant. }	Phlox Stolonifera, &c.	Daffodil.
Spiræa Prunifolia } and Deutzia Gracilis. }	Primroses, Violets, } and Pansies. }	Crown Imperial.
Lilacs.	American Cowslip.	Hyacinth.
Rhododendron and } May Apple Azalea. }	Lily of the Valley.	Star of Bethlehem.
Wistaria.	Tree Peony.	Jonquile Narcissus, &c.
Weigela.	Large Iris.	Tulips.
Spiræa Reevesii.	Phlox Maculata.	Anemone.
Sweet-scented Shrub } and Snow-ball. }		
Double Scarlet Hawthorn and Laburnum. }	Honesty. } Yellow Day Lily. }	{ Ranunculus and Spiræa Filipendula.
Syringa and Deutzia } Scabra. }	Baptisia.	Crimson Peony.
Laurel.	China Pink.	White Sweet Peony, &c.
Roses in varieties running through to winter. }	Canterbury Bells, } Chinese and other } Larkspurs, Sweet } William, Double } Feverfew, and Gailardia Picta. }	{ White Lily, and early-sown Annual Flowers, in varieties to run to winter.

TREES AND SHRUBS.	PERENNIALS AND BIENNIALS.	BULBS, TUBERS, &c.
Climbing Honeysuckles.	Verbenas, Petunias, } to continue through } the season.	Commelina.
Milk Vine.	Pinks, Picotees, &c. } Veronica, Fraxinella, } and Snapdragon.	Jacobean Lily.
White Jasmine.	Blue and Scarlet } Sage, Mourning } Bride, &c.	Mexican Tiger Flower.
Clematis and Passion Flower.	Phlox Speciosa, &c., } and White Day } Lily.	Gladiolus. Four o'Clocks.
Trumpet Creeper.	Hollyhocks.	{ Dahlias in varieties to run through to winter.
Rose of Sharon.	Virginian Dragon-head. Fringed Gentian. Artemisias in varieties till winter.	{ Double Perennial Sun-flower. Tuberose.

HARDY BULBOUS-ROOTED FLOWERS.

SPRING FLOWERING.

TEN KINDS.

1. Crocus, White, Blue, Yellow, &c. Among the very earliest flowers, and always beautiful.

2. Crown Imperial, *Frittelaria Imperialis*. A fine, early, showy flower, of lily-like character, but having an unpleasant odor.

3. Daffodil. The well-known large double yellow *Narcissus*; among the first blössoms of the season.

4. Hyacinth. See below.

5. Iris, Persian, &c. The varieties are numerous and beautiful; chiefly of various shades of blue, though some are pure white, and others of a fine golden yellow. The bulbous varieties should be taken up soon after flowering, and replanted in the fall, as they are apt to rot if left in the ground.

6. Lily, White, Tiger, &c., &c. *Lilium Candidum*, &c. Many and beautiful varieties, well known, both wild and cultivated.

7. *Narcissus*, White or the Poets', &c. A simple white flower with a small edged cup in its centre. The Jonquile *Narcissus* is yellow, and some of the varieties peculiar. Almost all are pretty and fragrant, whether single or double.

8. Snow-drop, *Galanthus Nivalis*. A simple white flower, of drooping ear-drop form, striped inside with green. It is the earliest blossom of spring, and deserves extended cultivation.

9. Star of Bethlehem, *Ornithogalum Umbellatum*. Another early simple white flower streaked with green, blooming in pretty large panicles. Common, but pretty; sometimes wild.

10. Tulip. See below.

All hardy bulbs should be planted in the fall, in light rich soil, rather sandy than otherwise, at from two to six inches apart, according to their size, and from two to four inches deep; and if planted in beds, let the surface be rounded slightly to throw off excess of water. Whenever there is special danger from mice or moles, hardy bulbs may be planted in pretty large pots, sunk where they are intended to bloom, which may either be taken up after the blooming or remain over. With the exception of the sweet Jonquil, which requires a little care, those named above are as hardy and as easily raised as onions, and their more general cultivation is desirable.

HYACINTHS may be planted singly or in groups or beds. If a bed is made it should be planted in October or early in November, setting the bulbs from six to eight inches apart, and full four inches deep. With care in respect to the tasteful arrangement of the different colors and the various shades of each, and attention to the natural varieties of height, which latter will be affected by the strength or weakness of the particular root, a fine effect may be produced independent of the merits of the individual flowers. That no mistake may occur, the arrangement should first be made on paper, and the diagram preserved for correction, if necessary, when they bloom.

Hyacinths will generally bear the winter well if planted at proper depth, yet some of the finer kinds, particularly the white ones, are of delicate constitution, and will more certainly keep and bloom strongly if the bed is annually mulched a

little for winter, taking care to remove the mulching at the earliest opening of spring.

They may also be planted in pots for house blooming. In this case the bulb should be left about one third uncovered, and the pots be set in a cool place, so that the growth may not be forced hastily. After they start they may be kept warm, needing only ordinary care, except that while blooming they should have plenty of water constantly in the saucers.

The Hyacinth, and also sometimes the Narcissus, is bloomed by house culture in water, in deep glasses known as bulb-glasses. These are filled, and the bottom of the bulb placed so as that it just and scarcely touches the water into which its roots descend, and the flower-stem is soon thrown up. The only precautions necessary are to start the growth slowly and at a low temperature, gradually raising it to ordinary house warmth (65°), and keeping it pretty even; change the water every three or four days, taking care that what you put in is as warm as that which you throw out. It is a highly exhaustive process, which can not be successfully repeated upon the same root for several years; but if such roots, after their blossoms decay, are thrown into water and allowed to remain until the leaves die, the roots, after being dried, may be planted in the open ground in the fall; but to reproduce a fine large bulb, the blossom stems for one or two years must be broken off as they start, just as what are called rare-ripe onions are raised of marketable size by breaking out the seed-pipes.

TULIPS may be planted and arranged precisely as above directed for Hyacinths in the open ground; but, instead of ordinary bulbous-root compost, the soil of the tulip-bed should be almost exclusively good surface loam, the sod being chopped and rotted, with one third road-wash or sand, and, if a little manure is added, let it be perfectly-rotted cow-manure, and dig it deeply in.

As soon as the flower falls, snap off the seed-vessel to aid the growth of the bulb.

Tulips have a habit of change, technically called running, in which the striping and brightness of the flower disappear in one dull muddy color, while the roots become multiplied and

strong. To counteract this tendency, and to preserve and improve the beauty of the flowers, "tulip-fanciers" pursue a system of artificial treatment by which the root is weakened, and, in fact, diseased; the bulbs, being taken up every year as soon as the tops die, are dried and planted again in the fall. This annual drying of the roots is usually found sufficient to *preserve* their character, except in wet seasons or too rich soils; but, in order to improve them or to originate new varieties, seedlings are raised, or certain kinds of superior form are selected, and the drying, accompanied by change of soil and other means, is carried to an extreme, the change caused by the process being technically called "breaking."

With seedlings, which, for this purpose, are always raised from finely-formed "selfs"—that is, flowers of one color without striping, the process is ordinarily continued for seven or eight years before they break into their proper colors, or attain a sufficient degree of fixedness in their habit.

Sometimes tulips break naturally; the cultivator finds a flower which, from its exquisite beauty, he does not at once recognize, and marks it for special preservation; but when, in due season, he digs for the root, it is found to be entirely decayed: the process of improvement had been carried to its climax. It was the hue of beauty on the cheek of death, exquisite loveliness linked to extreme fragility.

Persons often become enthusiastic in their admiration of these flowers, and very expert in their proper arrangement in the bed, which, under such hands, becomes one of the finest of floral exhibitions. With this view it is made seven rows wide, the taller-growing varieties occupying the centre or fourth row, and being known as "fourth-row flowers;" those somewhat shorter, or the weaker roots of the former varieties, being set on either side, and known as third-row flowers; and so on to the first row or outside flowers, the disposal of colors for the production of effect being also carefully attended to.

Double tulips seldom deserve culture, being coarse, formless, and generally thick colored. The double yellow rose-scented, the golden-centred crimson, and the bright red-striped "Mariage de ma fille," may be reckoned as exceptions.

TENDER BULBOUS-ROOTED FLOWERS.

SPRING AND SUMMER FLOWERING.

SIX KINDS.

1. *Anemone, Hortensis, &c.* A rather peculiar bulb or tuber resembling ginger-root, requiring care in planting, so that they be set right side up. They yield flowers of great variety and brilliancy of color.

2. *GLADIOLUS* or Sword Lily. A showy popular flower, a few varieties of which are fine, but many lack clearness of color.

3. *LILY, JACOBEEAN, Amaryllis Formosissima.* A fine, rich, deep scarlet flower.

4. *RANUNCULUS.* A fine flower of varied forms, cupped, globular, &c., and of bright scarlet, crimson, and other colors.

5. *TIGRIDA PAVONIA*, or Mexican-tiger Flower. The variety known as *Conchiflora* is the finest. There are many flowers in succession, each lasting from early morning until afternoon. If cut before opening and kept in entire darkness, they may be preserved until evening, and will then open in the light.

6. *TUBEROSE, Tuberosa.* A rather tall, free-growing flower, creamy white and fragrant, on which account it is esteemed. It may be started early in pots and turned out in season, or planted as directed below.

In planting tender bulbs, let them be covered carefully about two inches above the crown, pressing the earth upon them. The *Ranunculus* and the *Anemone* require planting in the fall in rich, strong, loamy soil, but must be protected through the winter of the North by a covering of leaves or mulch, in a cold bed; or, with care, the roots may be preserved through winter and planted in very early spring in a bed from which the frost has been excluded, receiving any necessary defense against recurring severity of cold in spring.

The others may be planted in the open ground when spring frosts are passed, and, being kept clean by occasional hoeing and weeding, will give their beauty or their fragrance in its season. They should all be dressed with liquid manure when they are in bud. Before winter, let the roots be taken up and

dried, and preserve them for replanting in boxes or paper bags in a dry, cool place, out of the reach of frost.

TUBEROUS-ROOTED FLOWERS.

DAHLIAS.

TWENTY-ONE VARIETIES.

Single-flowering Dahlias have entirely disappeared from cultivation, and double ones, which florists wrote of as rarities thirty years ago, are found to-day in almost innumerable varieties. The following list, though choice, is given only as an assortment of colors.

- | | |
|---------------------------------------|--|
| 1. Gem of the Grove, nearly black. | 13. Ansel's Unique, yellow, edged with scarlet. |
| 2. Beeswing, dark red. | 14. Mrs. Hansard, yellow, white tip. |
| 3. Bathonia, dark maroon. | 15. Striata Perfecta, lilac, striped and flecked with crimson. |
| 4. Sir Charles Napier, dark scarlet. | 16. Lilac King, finest of lilacs. |
| 5. Grenadier, bright crimson. | 17. Elizabeth, amethyst, white tipped. |
| 6. Brilliant, fine scarlet. | 18. Rachel Rawlings, peach-blossom. |
| 7. Sir R. Whittington, ruby crimson. | 19. Blanche fleur, pure white. |
| 8. Latour d'Auvergne, orange scarlet. | 20. Prince Albert, white, edged with lavender. |
| 9. Gasperine, maroon, white tipped. | 21. Empress Eugenie, white, edged with amaranth. |
| 10. Kossuth, scarlet, white tipped. | |
| 11. Cleopatra, clear yellow. | |
| 12. Oriflame, splendid orange. | |

Dahlias are of most easy culture, reconciling themselves to almost any soil, and poor soil is sometimes prescribed for them. It is possible that very tall, strong-growing kinds may be dwarfed and brought more readily into flower by this treatment; but it will be found safer to select moderate-growing kinds, and give them pretty high culture. With this, a dozen plants of different kinds will furnish a good variety and plenty of flowers.

To treat them properly, make holes of at least fifteen inches diameter and fifteen to eighteen inches deep; put into each about a peck of half-rotted manure, just such as you would use for hilling potatoes or corn; mix the earth through it, and chop it well up with the spade; fill up the hole a little above the natural level, and with a crowbar set a strong stake as deep as the bottom of your hole, and a little back of the centre.

This being done, and not before, open a small hole in the centre with your hand or a trowel, and set the plant in, an inch or two deeper than it has previously stood, or if it be a root not yet grown, set the crown the same depth below the surface, press the earth firmly about it, level the surface nicely, and it is in order.

At every six inches of its subsequent growth tie the main stem carefully, but not tightly, to the stake with *strong* bass-mat strips or cotton wick, colored if you prefer it. Hoe often around it while young, and nip the side shoots entirely, but not the stem-leaves, from the two lower joints of the stem. As the other side shoots grow, put an outer band or two around them, not binding them out of their natural position unless you wish to, but staying them against winds. Nineteen twentieths of your flowers will be due to your stakes and bands.

In the course of the season, when buds are forming freely, give them one or two dressings of liquid manure, and, if a drought occurs at this period, mulch them thickly. When the frost kills the foliage, hill a little earth around the plants if they are not mulched, and let them stand until the near approach of winter; then, in the morning of a fine dry day, cut off the tops, take them up, and, having shaken the earth from them, let them stand to dry for a few hours; then, carefully labeling each, put them into a barrel, and in a few days cover them over with a little straw and earth, or set them compactly upon the floor of a dry, cool cellar, and cover them lightly with earth or sand.

Just at the opening of spring, and not too early, take them out and set them close together; but singly, in a light hot bed, or immediately upon a few inches of warm manure, or in a warm spot without manure; cover them just over the crowns with good earth; keep them well watered, and shield them with a blanket or other defense from cold nights and storms.

When they have sprouted three or four inches, take them out on a warm day, and cut them apart, splitting first right through the centre of the old stem. Leave no more than one shoot to a plant, making cuttings of any surplus shoots. If you do not wish to divide the entire plant at once, uncover the crown

lightly, and cut off from the root the longer shoots, each with a tuber or more, or with only a small portion of the crown of the old plant. The tubers are of no consequence to the young plant after it strikes its own roots, and generally the less of the old tuber you plant the better, if you either pot the young shoots until they root, or plant them at once and shade them till they start. If you wish to increase them largely, each shoot may be thus cut out, as the eyes of potatoes are cut out for planting in times of scarcity, or you may still farther multiply them by making cuttings of them all. For this purpose, cut off each young shoot just above the crown, leaving the lower circle of incipient buds on the old root. Set each cutting thus obtained singly in a half-pint pot, and place them in a moderate and shaded hot bed, with plenty of air, until they are well started, which may require a week or two, when they are ready for setting out. When your old roots have thrown new shoots from the collar buds you left, cut your second and more numerous crop in the same manner, leaving just the collar circle of each, and treat them as the first. This may be continued and repeated far into the season, only taking care not to force the growth of shoots too fast, so as to destroy the stamina of the cutting.

At the close of the cutting season the old roots may be taken out and divided as first directed.

Dahlias are also readily raised from seed, which, though sufficiently abundant in the poorer sorts, is scantily yielded by the very finest varieties of this flower; but upon plants of the very best character certain comparatively imperfect blossoms will appear in the course of the season, and the earlier of these will generally furnish a few perfect and ripened seeds. These may be sown early in spring, in a box or hot bed, and should be transplanted while small into half-pint pots, and treated in all respects as directed for cuttings. With early sowing and care they will often blossom the first season, and always in the second, yet so large a proportion of seedling flowers prove of inferior character that private cultivators seldom find it worth while to raise them.

Dahlias are sometimes grafted upon tubers of common kinds.

For this purpose, cut the top of a single tuber horizontally ; cut a small and rather thin slice of an inch or two in length from one side ; take a young shoot and cut it into the form of a shouldered crown graft, making the shoulder-cut close to a bud—see page 233 ; let this shoulder-bud rest upon the head of your stock tuber, and fit the rinds together as in tongue grafting, but without tongueing ; bind it, and pot it, and set it in a hot bed as a cutting. This may be done for curiosity, but as a matter of business it is worthless. “*Le jeu ne vaud pas la chandelle.*” Other tuberous-rooted flowers are included in Annuals, Biennials, &c.

ANNUALS.

All annual flowers may be sown in the spring months, or even in June, and brought into bloom by care in their cultivation, few kinds requiring more than two months to produce flowers. For rules as to depth of sowing, &c., see page 84.

There are some kinds which shed their seeds and produce young plants in the fall, which continue through the winter, thus becoming in a sense biennial ; others shed their seeds, which commonly sprout abundantly in spring, but any plants that may grow in the fall are killed by the winter. In the following lists the former are marked “self-sowing in the fall,” the latter “self-sowing in the spring.” Of either class abundance of plants may generally be obtained after spring opens from any spot where they grew the previous year. Of the annuals named below, none will be found without merit, though some of them may, in certain sections, be so common as not to require cultivation. A few more might have been added, but if these are tastefully arranged and well cultivated, the flower-garden will be adequately supplied with this class of flowers. To economize space, detailed descriptions are omitted.

ANNUAL FLOWERS.

THIRTY-FIVE VARIETIES.

1. AGERATUM, BLUE, *Ageratum odoratum*. Pretty and sweet, about eighteen inches high.
2. ALYSSUM, WHITE SWEET, *Alyssum maritimum*. About

six inches high, simple and fragrant. Self-sowing in the spring.

3. ASTER, CHINA, *Aster Sinensis*. Fine varied colors, growing from twelve to fifteen inches high. Sometimes self-sowing in the spring.

4. BARTONIA, GOLDEN, *Bartonia aurea*. Spreading, but rising to the height of six inches.

5. BACHELOR'S BUTTON, *Gomphrena globosa*. White or purplish-crimson; globular or clover-like flowers, pretty for drying; a foot high.

6. *Calendrina grandiflora*, &c. A showy lilac flower, requiring to be sown very early in rich soil.

7. CANDYTUFT, White, Crimson, *Iberis coronaria, speciosa*. Simple border or edging flowers, six or eight inches high.

8. CENTRANTHUS, Long-tubed, *Centranthus macrosiphon*. A very pretty clear pink flower, about a foot high, a constant bloomer; does not well bear transplanting. Self-sowing in the spring.

9. COREOPSIS, GOLDEN, *Calliopsis bicolor* (heretofore *Coreopsis tinctoria*). Showy and fine, two to three feet high. Self-sowing in the fall.

10. COCKSCOMB, Buff, Crimson, *Celosia cristata*. From six inches to two feet high. Sow early in hot bed.

11. CLARKEA, Lilac-pink, *Clarkea pulchella*. Curious and pretty, six to eight inches high.

12. ETERNAL, GOLDEN, *Helichrysum bracteatum*. Pretty for drying; from two to three feet high. Sow early in hot bed.

13. EUPHORBIA, Variegated, Quaker's Daughter, *Euphorbia variegata*. Showy and peculiar, two feet high. Sometimes self-sowing in the spring.

14. GOLDEN CUP, *Chriseis crocea* (formerly *Esscholtzia*). Flower and foliage superior.

If the plants become straggling, cut them clean to the ground in July, and they will grow again and afford their finest flowers in the fall.

It often survives the winter, and is also self-sowing in the spring. About a foot high. *Chriseis alba* is similar except in color.

15. FOUR-O'CLOCK, Common, Sweet-scented, *Mirabilis jalapa*, *longiflora*. The former well known, two feet high; the latter spreading, and reaching sometimes a foot high: a long-tubed, pale pink fragrant flower. Tuberous-rooted, and may be wintered as dahlias.

16. HAWKWEED, Golden, *Crepis barbata*. A beautiful morning flower, but closing in the strong sunlight; six or eight inches high; trails.

17. HIBISCUS, African (a large flower of an hour), *Hibiscus Africanus*. A pretty morning flower, fading by noon, about a foot high. Self-sowing in the spring.

18. ICE PLANT, *Mesembryanthemum crystallinum*. Curious and pretty. Sow early in hot bed. Trailing.

19. LADIES' SLIPPER, or Balsam, *Balsamina hortensis*. From a foot to two feet high. The double or camellia-flowered varieties are showy and fine, but readily deteriorate if inferior flowers are allowed to open their blossoms near them.

20. MALOPE, Crimson, *Malope grandiflora*. Showy, growing from a foot to two feet high.

21. MIGNONNETTE, *Reseda odorata*. A simple fragrant flower, six inches to a foot high, and trailing, deserving the name which French taste has given it.

22. MONKEY FLOWER, *Mimulus*. Peculiar showy tubular flowers, from light yellow to deep orange, with spots and blotches of crimson; blooms the first season, and is sometimes self-sowing; easily propagated by slip cuttings; requires shade and plenty of water in summer.

23. MORNING GLORY, Dwarf blue, *Convolvulus minor*. A beautiful morning flower, a foot high, but trailing.

24. NEMOPHILA, Blue, or Love Grove, *Nemophila insignis*. Beautiful; requires shade and moisture; about six inches high.

25. PINK, French, or Ragged Sailor, *Cyanus minor*. Of fine varied colors, eighteen inches high. Self-sowing in the fall.

26. POPPY, Fringed, &c., *Papaver fimbriatum*, &c. Many varieties, very showy, from a foot to two feet high, and of all colors. Self-sowing in the fall or spring.

27. POPPY, Mexican, *Argemone grandiflora*. A rather handsome white flower, with a profusion of yellow stamens.

28. PETUNIA, White, Purple, &c., *Petunia alba*, *Phoenicia*, &c. A showy constant flower from May to winter, about a foot high, and trailing. Self-sowing in the spring.

There are double varieties, which are, as yet, inferior.

29. PHLOX, Drummond's, *Phlox Drummondii*. A fine variable pink flower, about a foot high.

30. PORTULACCA, Purple, White, &c., *Portulacca splendens*, *alba*, &c. Extremely showy, opening in the sunlight, about six inches high, and trailing. Self-sowing freely in the spring.

31. ROSE OF HEAVEN, *Viscaria oculata*. A simple, pretty, varied pink flower, with a dark eye.

32. SCHIZANTHUS, *Schizanthus venustus*, &c. Several varieties of delicate flowers, finely penciled and spotted, from eighteen inches to two feet high; a free and constant bloomer.

33. SENSITIVE PLANT, *Mimosa sensitiva*. Pretty foliage, which shrinks on being touched.

34. TASSEL FLOWER, Scarlet, *Caccalia coccinea*. A bright scarlet flower, of a tassel or brush form; pretty; from a foot to eighteen inches high.

35. VERBENA, *Verbena Melyndris*. A trailing plant of much beauty, and very numerous varieties, some of which are pleasantly fragrant. It grows and blossoms from spring to winter, rooting from each joint as it runs, thus forming plants to pot and bloom in house or green-house, or to winter in a cold bed and set out in the spring. New and fine seedling varieties are annually raised.

CLIMBING ANNUALS.

SIX VARIETIES.

1. COBEA, Climbing, *Cobea scandens*. Coarse but curious; dull purple, goblet-formed flowers.

2. CYPRESS VINE, *Ipomæa quamoclit*. A native at the South; both flower and foliage beautiful. Pour boiling water upon the seed, stirring it; pour it off in a few minutes, and sow immediately half an inch deep.

3. MORNING GLORY, Purple, &c., *Convolvulus major*.

MORNING GLORY, Large dark purple, *Ipomæa atropurpurea*.

MORNING GLORY, Scarlet, *Ipomæa coccinea*. Self-sowing in spring.

4. MAURANDYA, Purple, *Maurandya Barclayana*. A beautiful perennial vine, tender, but growing well and blooming abundantly as an annual ; its flowers are pendent tubes of a fine deep purple. There are also white, and mixed muddy varieties of little value.

5. PEAS, Sweet, *Lathyrus odoratus*. Fine fragrant flowers of various colors, running about four feet high.

6. THUNBERGIA, Buff, &c., *Thunbergia alata*, *alba*, &c. A pretty runner, bearing abundance of white, nankin, and orange-colored tubed flowers, with a dark puce-colored throat, looking like the pupil of an eye.

BIENNIALS.

TWELVE KINDS.

Biennials should be sown in the latter half of May, and by the first of August, or whenever they are of sufficient size, they may be transplanted into their permanent places. Shade them for a few days after setting out, and hoe and weed them often through the fall. In the spring clean them perfectly, digging lightly around them until they begin to throw up their blossom-stems. Such of them as generally or often bloom the first season are noted in the list.

1. CANTERBURY BELLS, Blue, &c., *Campanula medium*. Showy bell or goblet formed flowers, generally admired ; from a foot to eighteen inches high. Self-sowing in the fall.

2. COMMELINA, Blue, *Commelina celestis*. A plant of little show except in masses, with broad grass-like leaves, the exquisite tint of its rather scattered flowers constituting its only claim to cultivation. Though generally raised and treated as an annual or biennial, it is tuberous-rooted, and may be preserved as dahlias or potatoes. From a foot to two feet high.

3. FOXGLOVE, Purple, White, *Digitalis purpurea*, *alba*. A coarse mullein-like plant, throwing up strong spikes of light purple or white tubular flowers, the inside of the purple variety being spotted. Self-sowing in the fall ; two to four feet high.

4. HONESTY, or Satin Flower, *Lunaria biennis*. An early flower, of a rich though not very clear purple color, but deriving its name and credit chiefly from the thin transparent mem-

brane which remains after the seeds are shed. It somewhat resembles a small battledoor, having the texture of satin, and, like honesty, showing the same on both sides ; about eighteen inches high.

5. HOLLYHOCK, *Althea rosea*. A strong-growing coarse plant and flower, but often of fine colors ; very showy when blooming among shrubbery or by carriage-ways ; three to six feet high. It may be perpetuated by slip-cuttings.

6. LARKSPUR, *Delphinium Ajacis, consolida*, &c. These are showy biennial flowers, which also bloom as annuals, and often become favorites ; none of them are comparable to the Chinese Larkspur in its varieties, which has the same habit of free blooming and self-sowing. See page 463.

7. MONKSHOOD, *Aconitum napellus*. A tall, strong stem, bearing flowers of blue and white, with a tinge of yellow inside, of a curious double-hood form, whence its name. It ranks as a perennial, but is more properly a biennial that often holds over. Self-sowing in the fall or spring ; two to three feet high or more.

8. MOURNING BRIDE, Sweet Scabious, *Scabiosa atropurpurea*, &c. There are various shades of this flower, from a rich deep maroon to a poor lilac. Its fragrance is very pleasant, and is accompanied by a very slight pungency. It is an old and worthy favorite, often blooming the first year. Self-sowing in the fall ; about two feet high.

9. PINK, China, *Dianthus Chinensis* or *annuus*. A pretty little plant, yielding variously colored single and double flowers the first year from the seed, but blooming also the second year, and may be perpetuated by cuttings. They are also freely self-sown ; eight inches to a foot high.

10. PANSIES, Heartsease, *Viola tricolor*. A very common and very beautiful family of plants, both wild and cultivated, some of each being fragrant. Blooming the first year from seed, and easily preserved from year to year by slip cuttings, if desired ; a few inches high ; are abundantly self-sown.

11. SWEET WILLIAM, *Dianthus barbatus*. Some varieties of this flower are remarkably fine, having colors of almost dazzling brightness ; but less care than it deserves has been given

to it, and inferior kinds abound. No garden should be without the finer kinds. A foot high ; self-sowing freely.

12. SNAPDRAGON, *Antirrhinum speciosum*, &c. The snapdragon is a lip or mouth-formed flower of various and fine colors, having the amusing fashion of opening its mouth when pinched "back of the ears." The *Speciosum* is pure white, with lips of fine crimson. From a foot to eighteen inches high. They are freely self-sown, and sometimes the plants bloom the first year.

PERENNIALS.

TWENTY-SIX KINDS.

The seeds of perennials or herbaceous plants may be sown at any time through the spring, and the young plants, when of sufficient size, transplanted as directed for biennials, or they may be left in the seed-rows until the next spring.

For particular species of plants in the following brief list, special directions are given as to the modes by which they may be increased, but, in general, this is easily done by dividing the crowns of the roots either when they have ceased growing in the fall, or after they start in the spring. Usually, at this latter period, each spear, if separated with ever so small a portion of the root, or even slipped off without root, will grow, if proper care be given to shade and water it ; but the inexperienced cultivator should be content with a moderate division of the rooted pieces.

1. ADAM'S THREAD AND NEEDLE, *Yucca filamentosa* and *Y. gloriosa*. Almost entirely hardy aloe-like plants, producing upon a branching stem a multitude of white bell-shaped flowers. The first blooms most freely. At the North a little straw covering in winter is desirable.

2. ARTEMISIA or CHRYSANTHEMUM. Many varieties, with large or small flowers ; all showy, and some of them fine ; they are our latest fall flower.

The Paper White, the White Quilled, the Golden Lotus, the Straw and the Rose colored, and the Crimson or Purple, may be named.

For house-blooming, make cuttings early in August of about

eight inches of the point of each of the young shoots ; pot them as soon as they are well rooted in compost No. 1 or 4, pages 443, 444, and keep them regularly watered, and a fine show of blossom may be expected with a moderate growth of stem. The stems from which the cuttings were taken will also branch and blossom in their season.

3. BAPTISIA, Indigo-plant, *Baptisia atro-cerulea*. One of the most beautiful of native herbaceous plants, taking care of itself when once planted ; two feet high.

4. BLOODROOT, *Sanguinaria Americana*. A well-known wild plant, with clear white flower and pretty foliage, blooming in the earliest spring. It should have a cool, moist place in every garden, where such can be found. It is tuberous-rooted.

5. COLUMBINE, Wild, Garden, *Aquilegia Canadensis*, *Vulgaris glandulosa*, &c. All the varieties of *Aquilegia* are pretty, but none prettier than the wild, unless the *Glandulosa*, with its calyx-skirt of sky-blue covering a pure white "dimity" corolla, may be thought to excel it. The *Aquilegia Siberica* also is a rather peculiar variety, yielding its erect crimped double blue flowers profusely. From a foot to two feet high ; self-sowing in the fall.

6. COWSLIP, AMERICAN, *Dodecatheon media*. An early-flowering, lettuce-leaved plant of much prettiness ; a native of Pennsylvania and the Southwest ; flower-stems about six inches high.

7. CHINESE DIELYTRA, *Dielytra spectabilis*. A new, beautiful, and perfectly hardy Chinese plant, with curious rose-colored flowers. It is of the very easiest cultivation, blooming in early spring, and may be continued in succession through the season by slipping off a few cuttings from the crown of the plant in April, May, and June, or even July ; the later ones may be potted for house-blooming. About two feet high ; it will become a universal favorite.

8. DAY LILY, White, Yellow, Blue, *Hemerocallis japonica*, *flava*, *cerulea*. The first pure white, the second clear lemon-yellow, and both of exquisite fragrance. The blue is not fragrant, but is admired. From a foot to two feet high.

9. DRAGON'S HEAD, VIRGINIAN, *Dracocephalum Virginianum*. A wild plant of Pennsylvania and southward, bearing spikes of light lilac tubular flowers, finely and curiously spotted inside. Grows about two feet high, and needs care to prevent it spreading itself too freely.

10. EUPATORIUM, Blue, *Eupatorium celestinum*. A wild plant of the South and Southwest, of a beautiful sky-blue; nearly two feet high; increased by its roots too freely.

11. FEVERFEW, DOUBLE, or LAFAYETTE DAISY, *Pyrethrum parthenium plena*. A very pretty pure white flower, blooming freely in the green-house or garden. The old plants are apt to winter-kill, but young plants from cuttings are quite hardy. Common or slip cuttings root without care if planted in the shade.

12. FRAXINELLA, Red, White, *Dictamnus fraxinella*. A peculiar and strongly fragrant plant, its smell producing in some persons nervous headache. Its blossoms give out an inflammable gas.

13. GENTIAN, FRINGED, *Gentiana crinita*. An upright tubed flower, of an exceedingly fine pale blue, the edges being delicately fringed. Found every where in the shady spots of moist meadows in early fall, growing from six inches to a foot high. It is one of the most beautiful of flowers.

14. IRIS, *Fleur de Lis*, Purple, White, &c., *Iris purpurea*, *celestina*, *alba*, &c. Of these there are many showy and fragrant varieties. The dwarf purple, *Iris humilis*, makes a good edging for paths. Six inches to two feet high.

15. LARKSPUR, CHINESE, &c., *Delphinium Sinensis*, &c. The flower of the Chinese Larkspur is sometimes white, but mostly of various fine shades of blue.

The young plants bloom freely the first season, continuing till quite late, and from year to year it will be found one of the chief and most constant ornaments of a garden.

The Double Chinese and Breck's Seedlings are superb varieties of this flower.

16. LILY OF THE VALLEY, *Convallaria majalis*. A low-growing, small, white, bell-formed flower, of pleasant fragrance and beauty.

17. LYCHNIS, SCARLET, *Lychnis Chalcedonica*. The fine bright scarlet of the flower, rivaling the Chalcedony, is its chief recommendation. From a foot to two feet high.

18. PEONY, large Crimson, Rose, White, Chinese Tree, &c., *Pæonia officinalis*, *rosea*, *Whitlijii*, *Moutan*, &c. A well-known and large class of showy flowers, many of them fragrant. The last, *Pæonia Moutan*, is a low shrub, yielding an abundance of large rose-colored flowers. It is increased by layers and offshoots, the former rooting rather slowly.

19. PHLOX, Crimson, Striped, White, Pink, &c., *Phlox speciosa*, *Van Houtii*, *pyramidalis*, *stolonifera*, &c. The last, *Phlox stolonifera*, is a trailing variety, one of our earliest spring flowers; the others are summer or fall flowers, of all hues, and well worth the little culture they require. The whole family belong to our continent, but they are sometimes known as French or Spanish lilacs. The "grass pink" used for edging is the *Phlox subulata*.

20. PINKS, PICOTEEES, CARNATIONS, *Dianthus plumarius*, *caryophyllus*, &c. Varieties of the garden Pink, *Dianthus plumarius*, are more or less common every where; but the larger Picotee, or "spotted" Pink, and the striped, or Carnation, are comparatively rare, from causes which are, however, easily obviated. In general, the odor of the pink is increased with the depth of its color, and the dark crimson Carnations are called cloves from their strong spicy fragrance.

Some very double flowers are liable to burst on one side, and become irregular and unsightly. If such are cultivated, the divisions of the calyx, or flower-case, should be cut open equally with a pen-knife about a quarter of an inch down, and a band of yarn or narrow bass strip tied around the middle of the bud to stay it. Fancy cultivators slip a circular card, with a cross-cut opening in the centre, over the main bud, to be drawn up to form a tablet for the flower when it opens, trimming off also all side blossoms to strengthen this one. All the varieties may be increased by seeds, by cuttings, or by layers.

The natural state of almost all flowers is single, or, at most, semi-double; and most pinks raised from seed yield single flowers, which, though sweet, are not esteemed; but a few fine,

and sometimes superior flowers are also obtained. Seeds should be sown in spring in good soil, and lightly covered, and the young plants transplanted when about two inches high. To make a pink cutting of the larger varieties, take off the young tender shoot before it starts to run up to blossom; uncover the lower buds or joints by stripping off a few of the older leaves; then, with a keen knife, cut the stem clean off very close below the slightly swollen ring or joint of the stem; trim off the next one or two pair of leaves just where they begin to diverge from the stem, and shorten the points of the rest an inch or two, if at all spreading, by a single cut. See Fig. 303 *e*, p. 438. Set the cutting in good light earth, or compost No. 2, p. 443, from an inch to two inches deep, according to the strength of the growth and length of the shank; press the earth firmly about it with your thumb and finger; water it moderately, and cover it either with sash, or hand-glass, or bell-glass, or tumbler, or simply set it in the shade, and, in general, you will succeed to your satisfaction. Cultivators sometimes slit the butt of the cutting between the buds, about half an inch up, with a view to induce an outgrowth of roots from each, one side only throwing out roots when it is left whole, which yet, upon other accounts, is to be generally preferred, unless in skillful hands. The smaller varieties are cut in the same manner, but require less trimming. See Fig. 303 *f*, page 438.

Pink cuttings are also called "pipings," from the stem being entirely sheathed by each pair of leaves, which are left in a pipe or tube form, when the cuttings are made by simply drawing out the heart-growth down to the desired joint, as is sometimes practiced with the garden pink, Fig. 303 *g*, *h*, p. 438. Layers are made as directed page 441.

Both cuttings and layers should be made in June, just at the time of blossoming, and must be watched and watered once or twice with weak liquid manure, and shaded or mulched, being also examined occasionally, so that, as soon as they are well rooted, which will be in a month or six weeks, they may be transplanted carefully and shaded till they take hold. If intended for winter blossoming, they may be potted at once.

In one or other of these modes they should be renewed every year. The plants raised by layers are not quite so hardy as those from cuttings or seeds; but the *young strong plants* of almost all of them bear the winter about as well as grass, while the old ones of the larger kinds require to be housed, and even those of the smaller kinds suffer by exposure.

Skillful florists of taste and fancy, who take pride in floral exhibitions, practice various arts in preparing flowers for show, known technically as "dressing" them. By means of a pair of long and delicate tweezers, or tongs, usually of wire, with flattened and smoothly-finished ends, the petals are arranged to the very best advantage; any curled, or imperfect, or misplaced petals are removed, and, if need be, substitutes from another flower inserted. It is the careful, and not always honest toilet of the flower, that it may catch the eye and secure the conquest.

Pinks, Picotees, and Carnations are peculiarly liable to be made the subjects of these manipulations, although, perhaps, no class of show flowers is entirely exempted from them.

21. PRIMROSE, &c., *Primula*. This class of flowers, including the Primrose, Polyanthus, Cowslip, &c., are, like the Daisy and Pansy, early and very pretty, though at the north the winter is too severe for some of them if unprotected. They are increased by dividing the plant when it has done flowering for the season, shading the young ones for a while.

22. SAGE, Blue-flowering, *Salvia angustifolia*. The flower is of an extremely fine shade. See also page 472.

23. SPIKE FLOWER, Steeple-top, *Veronica spicata, variegata*, &c. Simple pretty flowers of numerous varieties, some growing three or four feet high, and others hiding their minute and delicate beauty among the short grass by the wayside.

24. SPIRÆA FILIPENDULA. A small, pure white double flower, of peculiar delicacy of habit, yet hardy and easily raised if slightly shaded from the strong sun. It has small tuberous roots, and is increased by dividing from the crown.

25. SUN-FLOWER, DOUBLE PERENNIAL, *Helianthus multiflorus pleno*. A tuberous-rooted sun-flower, bearing numer-

ous double yellow blossoms, of the size of dahlias, in early fall. Grows about four feet high.

26. VIOLET, Poetic or Single Purple, Double Purple, Double Blue, or Neapolitan, *Viola odorata* in vars. All delightfully fragrant. The Double Blue requires winter protection, and the Double Purple is liable to suffer if entirely unsheltered. Either of the latter may be bloomed in pots in the house.

GREEN-HOUSE PLANTS.

Scientific cultivators divide what are commonly called "Green-house Plants" into two classes: "Stove Plants," that is, intertropical plants, which require a higher temperature or a longer continuance of heat than even our New York summers afford, in order to their healthful growth; and Green-house Plants proper, or such as, being natives of the warmer portions of the temperate zones, require only protection through the winters of the colder latitudes.

There are many elaborate treatises on the construction of green-houses, with the various modes of heating, and the proper cultivation of plants in them, of which those who desire to obtain detailed and precise instructions in this department may avail themselves. The limits of this work will permit only a reference to the more familiar varieties, and the simplest arrangements for their winter protection or culture.

SHRUBS FOR THE GREEN-HOUSE.

EIGHTEEN KINDS.

1. ABUTILON STRIATUM, *Striped Abutilon*. One of the most elegant and free-blooming of green-house shrubs. It is increased from cuttings almost as readily as the willow. There are larger flowering varieties not so pretty.

2. AZALEA INDICA, PHŒNICIA, &c. The pretty wild varieties of Azalea are known as the May-apple, Honeysuckle, &c.; but there are many fine varieties for green-house culture, of which the Phœnicia is perhaps the most generally admired. It is a purple. They are increased by layers, or by cuttings *in sand*, with heat under them, as immediately over the flue or pipes, &c., in the green-house, or in a light hot bed, and cov-

ered with a bell-glass. Seedlings are also raised in sand and peat under a bell-glass with care.

3. *BIGNONIA VENUSTA*, &c., *Beautiful Bignonia*. A fine, tender trumpet flower for a green-house climber. Increased by layers or cuttings.

4. *CAMELLIA JAPONICA*, *Japan rose*. The varieties of this splendid flower are without number. A pretty full assortment of them would require a large green-house. If only a few are desired, *Alba plena*, the old double white; *imbricata*, crimson and white; *Jeffersonii*, bright crimson; *Washington*, deep crimson; and *Americana*, blush dashed with rose, all of fine form and free bloomers, may do well for a beginning. Camellias are capable of bearing slight frosts with but little, if any injury. They are increased by layers, cuttings, and seeds sown as soon as they are ripe, or by tongue grafting, or inarching upon stocks of single-flowering kinds provided for the purpose.

5. *CITRUS*, Orange, Lemon, &c. See page 362.

6. *CYTISUS RACEMOSUS*, &c. A pretty class of bushy, small, yellow, pea-blossomed shrubs. Increased by layers, offshoots, and cuttings.

7. *DAPHNE ODORA*, *Sweet Daphne*. A shrub of which the flowers are very fragrant. Increased by cuttings under glass.

8. *DEUTZIA SCABRA*, *D. GRACILIS*. Hardy shrubs abounding with pure white blossoms, either potted in the green-house or set in the open garden. Increased by offshoots, layers, or cuttings.

9. *GARDENIA FLORIDA*, *Florida jasmine*. A shrub with white fragrant rose-like flowers. Increased by layers or cuttings under glass.

10. *HOYA CARNOSA*, *Wax-plant*. Quite a pretty and peculiar climber, with panicles of wax-like honeyed flowers, and thick, fleshy leaves, which root when planted as cuttings. It is also increased by ordinary cuttings, layers, or offshoots.

11. *LAGERSTREMIA INDICA*, *Crape Myrtle*. A shrub which at the South is hardy, bearing abundance of clear pink blossoms, delicately fringed or cut, with a crinkled, crape-like appearance. It is improved by pretty close winter pruning. Increased by cuttings under glass.

12. *LAVANDULA SPICATA*, *Lavender*. A small shrub classed among herbs, modest but worthy, bearing short spiked pale blue flowers, of a fine delicate odor, which they preserve when dried, and yield freely by distillation. The perfume is much used in making Eau de Cologne. It is hardy south of New York, and may be raised from seed, as sage (see p. 176), or by common or slip cuttings.

13. *NERIUM OLEANDER*, &c., *Oleander*. Several varieties of a showy and free-growing plant, with rose or crimson flowers, &c., well known under its common name. Increased by offshoots, layers, or cuttings in earth or water.

14. *PASSIFLORA CÆRULEA*, &c., *Passion Flower*. Several of the tender varieties are singularly fine. Increased by offshoots or layers, and cuttings of the very young growth will root pretty well under glass.

15. *PITTOSPORUM TOBIRA*, *Pittosporum*. A pretty large green-house shrub, with glossy laurel-like leaves and single white flowers in small bunches, having a piny fragrance. Increased by layers or cuttings.

16. *Rosa*, *ROSE* in varieties. Lamarque, Solfatarre, Chromatella, among running roses, and Hermosa, Devoniensis, La Reine, and Souvenir de Malmaison among those of bush growth, may be named, to which additions may be made to such extent as individual taste may prompt. Young budded plants generally bloom well in the house or green-house.

17. *SPIRÆA REEVESII*, &c., *Reeves's Spiræa*. A hardy shrub, with abundance of pure white flowers in green-house or garden. *Spiræa prunifolia* forms a small and rather compact bush, which covers itself with small double white flowers. Increased by offshoots, layers, or cuttings.

18. *VIBURNUM TINUS*, *Laurustinus*. A pretty evergreen shrub, hardy at the South, with panicles of delicate white flowers. It is quite ornamental. Increased by offshoots, layers, or cuttings shaded under glass.

All the above "shrubs for the green-house" that are not entirely hardy *may* be wintered safely, with a little care, in a common cellar with-air and light.

PLANTS OF SMALLER GROWTH FOR THE GREEN-HOUSE.

TWENTY-ONE KINDS.

1. *ALOYZIA CRITIODORA*, *Lemon Plant*. A well-known old favorite. The lemon fragrance of its foliage has given it a name. Its flower is simple, but pretty. Increased by layers ; or cuttings of the last year's growth root freely, with or without glass, particularly if taken before they start in the spring from plants that have rested from growth through winter.

2. *AMARYLLIS FORMOSISSIMA*, *Jacobean Lily*. A fine deep scarlet lily, blooming freely potted in compost No. 3 ; bulbous.

3. *BEGONIA SANGUINEA*, &c., *Crimson-leaved Begonia*. A peculiar soft-stemmed plant, with red leaves or leaf-veins, and delicate pink or flesh-colored wax-like flowers. Increased by offshoots or cuttings. New and curious varieties abound.

4. *CALCEOLARIA*, *Purse Flower*. There are many varieties of this plant, some of which are herbaceous, others woody. They all bear flowers of a peculiar bag form, and in general are finely colored or spotted. Pretty in green-house or garden, but do not bear exposure to a strong sun. Increased by seeds or cuttings.

5. *CALLA ETHIOPICA*, *Lily of the Nile*. The well-known pure white funnel-formed Ethiopian Lily. Increased freely by offshoots if kept moist.

6. *CINERARIA*. A numerous family of very showy house plants, which bear profusely their star-like flowers, generally edged with various shades of crimson, and purple, and lilac around a white centre. Increased by cuttings, and in some varieties freely by offshoots.

7. *DIELYTRA* *SPECTABILIS*, *Beautiful Dielytra*. A hardy plant, but making one of the finest ornaments of the green-house. See page 462.

8. *FABIANA IMBRICATA*. A delicate heath-like plant, covering itself with small white tubular blossoms. Cuttings root freely under bell-glass in the shade.

9. *FUCHSIA*, *Ladies' Ear-drop*. Of this old and favorite house-plant there is now a large number of new varieties, some of them very beautiful, some only peculiar, and some coarse and

lacking almost entirely the grace that distinguished the older kinds. They are all readily increased by cuttings.

10. *HELIOTROPIUM*, *Heliotrope*. A common house plant, with light or dark lilac blossoms of delightful fragrance. Increased readily by cuttings.

11. *IPOMÆA*. There are several varieties that make desirable climbers for the green-house; their flowers resemble the *Convolvulus*, but are of surpassingly fine colors. Increased by cuttings set in sand under a bell-glass, in a warm but shaded spot.

12. *JASMINUM REVOLUTUM*, *Yellow Jasmine*. A semi-climbing plant, bearing yellow tubular flowers, the margin of which is rolled a little backward. Increased readily by cuttings.

13. *LONICERA JAPONICA*, *Japan Honeysuckle*. A favorite fragrant climber. Increased by cuttings.

14. *LOPHOSPERMUM ERUBESCENS*, *Pink Lophospermum*. A rather delicate climber, bearing somewhat sparsely fine light pink flowers of a tubular form; sometimes set in open borders in summer.

15. *MAURANDYA BARCLAYANA*, *Purple Maurandya*. A rapid and showy climber, with rather large tubed flowers of a fine purple color; often raised as an annual—see page 459. Increased by seeds or cuttings.

16. *MIGNONNETTE*. Sown in pots, and not permitted to seed, it will continue to grow and blossom throughout the year.

17. *PELARGONIUM*, *Geranium*. Of these plants there are innumerable varieties, many of them of great beauty, and a number with fine fragrance both of the leaf and blossom. All of them are increased freely by cuttings. When these are taken off very young, or from the fleshy-growing kinds, the cut ends should be suffered to dry a little before they are planted, to prevent rotting. Some of the kinds may also be raised readily from cuttings of the root.

18. *PETUNIA ALBA*, &c., *Petunias*. These showy annuals may be made to ornament the green-house or parlor by potting either old or young plants or cuttings in the fall, having first pretty thoroughly trimmed them; they will grow afresh, and

blossom freely throughout the winter with ordinary house treatment.

19. *SALVIA SPLENDENS, FULGENS, &c., Scarlet Sage, &c.* The green-house varieties of Sage, which also flower freely in summer borders, afford flowers remarkable for the richness of their colors. They are easily increased by cuttings.

20. *VERBENA MELYNDRIS.* Select varieties. Beautiful and fragrant. See page 458.

21. *VIOLA ODORATA, Violets.* Sweet Violets should have a place in every green-house or parlor as well as garden.

Almost all the above, as noted under each, may be raised from cuttings planted in June, and shaded either under glass or without it. As soon as they begin to root they should be potted in suitable compost—see page 443—taking care to put small sherds, or stones, or broken shells into the bottom of each pot for proper drainage; trim the young roots, if they have become long; fill up the pot sufficiently before putting in the plant; set its roots naturally, and fill the pot up carefully, shaking it a little from time to time, and pressing the earth moderately around the roots with the hand. Shade and water them carefully for a few days until they start afresh. If they are first set in small pots, they will require repotting with the older plants in August or September, preparatory to taking them in for winter. At this time let all straggling growth be removed, and all excess shortened, and the plants, both old and young, be brought into snug compass and neat condition. Let all matted roots also be cut away, and long ones be shortened; remove a considerable portion of the old earth, and replace it with fresh compost. Shade and water them with special care until they recover from the operation, and before taking them in for winter, pick off all dead or faded leaves, and burn them.

If it be proposed simply to preserve the plants of this class through the winter, the shrubs and many of the smaller plants may be kept in a light, airy cellar; but it is better that they be placed at once in a pit so graded as that the tops are eight or ten inches below the glass. The pit being properly banked around, the sashes may be put on when found necessary for the defense of the plants, and shutters, or straw mats, or both,

added as the cold becomes more severe, covering still thicker, if required, with long stable-manure. Keep these coverings dry from the first by spreading over all, and carefully fastening, a strong canvas or India-rubber sheet that will shed the rain, and with which any ordinary snow can be rolled off as soon as the storm ceases. Open the front of the sashes to give air in mild weather, but keep them closed at all other times, letting in the shaded light occasionally, in bright moderate weather, at midday. As spring approaches, lessen the covering, and gradually increase the air and light given until it is time to take them out for the summer.

If it is intended to keep and bloom them in the house, they may be placed in a cold bed until the severe frost approaches, and then be transferred to a well-lighted room, without heat, and placed on their stands with castors; or they may be at once taken to such a room in early fall, leaving it open day and night when the weather is not too severe; into this room, by means of a drum, or register, or small stove, introduce only just so much warmth as will exclude frost until about midwinter, then very gradually increase the heat until it rises to about 65° in the day; let it sink in the night, but not lower than to about 40° at the lowest. If the thermometer goes above 70° , let in air carefully at the top of your windows. Never permit *sudden* variations of temperature; if these occur to any considerable extent, they will prove as injurious as a frost. Remove all decaying leaves, and keep the plants clean by washing them off with *tepid water* at least once a week if they become dusty: this may be effected by dipping their tops in a tub of water and moving them gently in it, or, if needful, the cleansing may be aided by the careful light use of a soft brush or fine sponge; or set them one or two at a time in the tub, and shower them with the common rose watering-pot, held two or three feet above them, adding to this also, if necessary, the use of the brush or sponge.

If a room heated by a drum or register is appropriated exclusively to them, and they do not become dusty, water may be given moderately upon the surface of the earth in the pots once in three or four days, if it seems to be getting dry; but

do not suffer water to stand in the saucers unless it be for bulbous roots or water-plants, as the Calla, when blossoming. Let light and air be admitted as freely as is found safe. With care in this respect, any arrangement by which the room can be filled with the steam of clear water twice a week, for a few hours at a time, until it moistens the leaves, will preserve the plants in perfect health. For this purpose, a flexible steam-tube, that will fit on to the steam-tube of a kitchen boiler-cover, may be bought for about twenty cents a foot. If, however, they are in the parlor, this can not be done, and, whether there be dust or not, showering or dipping will be essential, or the more tedious process of washing each plant leaf by leaf with a soft sponge.

All winter watering and washing of plants should be done in the morning, or at least *when the heat is rising*; but the steam may be let in at night, and, if desired, form an important part of the heating medium during that time.

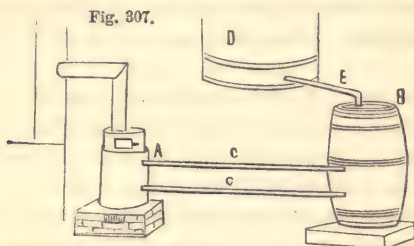
Upon the south side of any dwelling a conservatory or plant-room may be made, in which plants will grow and bloom finely through the winter with no more artificial heat than may be afforded by a register from the adjoining room, and the occasional use of steam as above directed. For such a room or conservatory the sashes should be glazed on both sides, about an inch space intervening between the panes; and, as this double glazing makes the sashes heavy, provision for admitting air should be made by having one or two of them short, and arranged to slide horizontally.

No shutters are needed, but shades will be found essential; for, if the full sunlight be admitted, the oft-repeated and great fluctuations of temperature between noon and midnight, or between the warmer and colder days of winter, will forbid success, except with the very hardiest plants. An equable but gradually advancing temperature must by all means be secured.

If a cheap green-house is desired, one may be built precisely as directed for a cold grapery, page 355. Arrange the "staging" for your plants, consisting of shelves, placed stair fashion, six inches wide, and varying from seven to ten inches high, leaving a broad platform toward the back wall, upon

which the larger plants may be set. Place other shelves, as may be found convenient, along the front, or in any spare space, for smaller plants or cuttings.

It may be heated by a small common brick flue running entirely around it under the staging, rising a little as it goes, and connecting with a chimney at the end. If the draught is insufficient, it may be increased by a pretty high wooden extension of the chimney, to be well secured against the wind. If preferred, the heating apparatus figured and described below may be introduced.



a. A small copper cylinder furnace, with common stove draught, of which the fire-chamber is thirteen inches deep and nine inches diameter, surrounded by a copper water-chamber; whole diameter eleven inches. The draught and fire managed as in a common stove.

b. The boiler, placed a little higher than the furnace. It may be a barrel, or a metallic vessel, which will radiate more heat.

c, c. Iron circulating tubes from the water-chamber to the boiler.

d. Water-tank, to be kept filled.

e. Supply-pipe from tank to boiler, to be governed by a floating ball or other arrangement in the boiler.

The above apparatus, which may cost some \$10, was, I believe, originally intended to be used with tubes only a few inches long, for heating water for domestic uses; but it serves admirably for a small green-house, in which it may be all hidden by the staging, &c., except the furnace. Let the arrangement be such as to make the course of the circulating tubes as direct as possible between the water-chamber and boiler, rising a little toward the latter. The only danger is of collapse from exhaustion of the water in the boiler below the mouth of the upper tube, and this is entirely removed by attention to filling the tank regularly, and as often as is necessary. A little experience will enable you to regulate the degree of fire to be kept up. A barrel of water, at a distance of sixteen to twenty

feet, may be boiled in about an hour, and an escape tube should be fixed so as to carry the steam entirely outside when not required for heating, &c.

When using it for any purpose within the house, fix the covering, &c., of the boiler so that the escaping steam will not strike any plant directly. When it is thus permitted to escape during the night, your plants, on opening the house in the morning, will generally appear as if covered with the heavy dew of a cool night in early fall. They will not need syringing, but perhaps a little care to place any plants that may be disposed to suffer from moisture near to the furnace, where they will dry off quickly. Let your sashes be well glazed; cover them with good shutters or straw mats, or use double glazed sashes and shades, and give attention to the gradual increase of the temperature as above directed for house treatment. Water moderately in the morning once or twice a week, as may be found requisite, rather giving too little than too much at any one time. If the temperature rise to 70° , give air at the back ventilators; and if higher, admit a little also at the door or lower ventilators, or both.

The green-house is sometimes troubled with a small bright red spider, which is very injurious to the plants. Moisture prevents it; but if it appear, the house should be whitewashed while the wash is still hot, mixing into each pailful about a pound of sulphur. If aphides or other insects infest the plants, close the house carefully, and burn tobacco in a small furnace or otherwise in it, until completely filled with the smoke, allowing it to remain thick for fifteen or twenty minutes; then open the house and syringe it thoroughly.

With the same view, single plants may be set in a covered barrel containing tobacco, which may be rapidly burned by blowing through a small draught-hole left for the purpose near the bottom; or the same end may be attained by setting a few sticks around the plant, and throwing a cloth over and around it, burning the tobacco underneath. For large plants an umbrella may be used, with a stick of sufficient length spliced for the time to its handle, and a cast-off skirt, hooped if convenient, with the gathers taken out, run on to its outer edge; this

being set over the plant by fixing the lower end of the stick in the earth, the tobacco-burning proceeds.

Dipping the plants in tobacco infusion or weak ley may be substituted ; but, whatever course is adopted, the plants must be dipped in, or showered, or syringed with clear water almost *immediately* afterward, and the plants so treated will not continue free from these pests unless kept in vigorous health by increased care.

If earth-worms become troublesome, water the pots a few times with lime-water.

In the spring, when the plants are taken out for the season, clear them perfectly from dead leaves, &c. ; wash the outside of the pots ; clean the house thoroughly, and let all the gathered rubbish be carefully burned. In the fall when they are taken in again, repeat these operations.

HARDY SHRUBS.

TWENTY-FIVE KINDS.

All flowering shrubs and plants that bear their blossoms upon the young growth of the season, as the Althea, or August flower, the Rose, &c., should be carefully and pretty closely trimmed every winter or spring. Others, that produce their flowers on the branches of the previous season's growth, should only be pruned so much as is needful to secure compactness and symmetry of form.

1. ALMOND DWARF, DOUBLE-FLOWERING, *Amygdalus Persica*. A very showy early flowering shrub. Raised from offshoots or layers.

2. BUFFALO BERRY, *Shepardia argentea*. This is classed among fruit-bearing shrubs, but it is also quite ornamental. Increased by layers or seeds.

3. BURNING BUSH, *Euonymus Americanus*. Its common name is derived from the profusion of bright red angular berries which it bears in the fall. Raised from seeds or layers.

4. BUSH HONEYSUCKLE, *Lonicera*. Several pretty pink flowering varieties. Increased readily from offshoots, layers, or cuttings.

5. CHINESE WEIGELA, *Weigela rosea*, *W. amabilis*. A new

hardy shrub from Northern China, with a profusion of single rose-colored flowers, somewhat resembling the smaller Rose Bay or Rhododendron. Increased by offshoots or layers.

6. DEUTZIA, Large-flowering, *Deutzia scabra*; Small-flowering, *Deutzia gracilis*. These very pretty shrubs are of similar habit in every respect, except the size of their blossoms and growth. Their abounding pure white flowers resemble a multitude of snow-drops hung gracefully upon the branches, one of which might well suffice to form a bridal wreath. Increased from offshoots, layers, or cuttings.

7. FALSE INDIGO, *Amorpha fruticosa*. A wild shrub of Pennsylvania, bearing spikes of blue flowers in July. Increased by layers, cuttings, or seeds.

8. FLOWERING CURRANT, Rocky Mountain Currant; *Ribes aureum*, Golden Flowering; *Atro sanguineum*, Scarlet. Very showy shrubs, that are increased by layers or cuttings, and almost too readily from offshoots.

9. FORSYTHIA, CHINESE, *Forsythia viridissima*. A showy early-flowering shrub, its branches seeming ruffled with the abundance of its curious crumpled yellow blossoms. The foliage which comes after the flowers is of a fine deep green, and the whole plant ornamental. Increased by offshoots, layers, or cuttings.

10. FRINGE-TREE, *Rhus cotinus*, Venetian sumach. A shrub rather curious than pretty.

11. FRINGE-TREE, THE AMERICAN, *Chionanthus Virginica*. Common about New York and southward. Bearing a profusion of white fringe-like flowers in the spring. Increased by offshoots or layers.

12. GLOBE FLOWER, *Kerria japonica*. A showy yellow flowering shrub of willowy growth, spreading so much from the roots as often to be deemed a pest.

13. LILAC, COMMON AND PERSIAN, Purple, White, *Syringa grandiflora*, *Persica*. Well-known flowering shrubs. All are increased by offshoots or layers. The common white and the Persian, both white and purple, are worthy of more extended cultivation.

14. MAY-APPLE, *Azalea nudiflora*. Known also as "Hon-

eyesuckle," "Pinxter Blomache," and "Swamp Pink." There are many hardy varieties of these pretty shrubs, all which may be increased from layers or seeds. Prune closely, or cut them clean down if transplanting them from the swamps or woods.

15. MEZEREUM, *Daphne mezereum*. Except the wild Yellow-root and the Leather-wood, this is the earliest shrub that puts forth. Its blossoms are purplish, showy, and very fragrant. Increased freely from its pretty red berries, if sown as soon as they drop. It should have a deep, dry, loamy soil.

16. OSAGE ORANGE, *Maclura aurantica*. A thorny shrub, with foliage and worthless fruit resembling the orange. It is ornamental, but is chiefly used for hedges, which, when made, should always be trimmed pyramidally—that is, broad at the bottom, and gradually narrowing to the top, otherwise the overshadowing top will kill the undergrowth and spoil the beauty of the hedge. Increased by seeds, layers, and cuttings.

17. PRIVET, PRIM, *Ligustrum vulgare*. A small, pretty semi-evergreen shrub, used for ornamental hedges or singly. Increased from offshoots, layers, or cuttings, planted in the fall.

18. ROSES, *Rosa Damascena*, &c. Annual Roses bloom but once a year, in spring or early summer, and hence are often called June Roses. Autumnal and ever-blooming Roses blossom most heavily at this season, but bloom again more or less freely, according to soil, climate, and treatment, throughout the summer and fall, which gives them their peculiar value. The fragrance of the Annual Roses, as a class, is very distinct from the perfume of the old Monthly or the more tender and highly-scented Tea Roses, &c., and it has been so long connected with recurring spring or opening summer that it is highly esteemed, not only for its intrinsic character, but also for its pleasant associations. Many of the stronger-growing autumnal Roses are of similar odor, and, though blooming in late summer or fall, bring back, as we gather them, all the freshness of the opening season. The kinds named below are selected from various classes of Roses known as Bourbons, Perpetuals, Remontants, Hybrids, &c., &c., the distinctions between which are arbitrary, and unintelligible to all but the florist or amateur, and are therefore entirely disregarded.

ANNUAL ROSES.

EIGHTEEN VARIETIES.

DARK.

Tuscany, Black Tuscany, dark velvety purple.
Rivers' George IV. (pillar), rich violet-crimson.
Dutch Velvet, bright carmine.
Gloire de Colmar, deep crimson.

ROSE COLOR.

Maiden, deep rose.
Moss, Common Blush, rose.
Moss, Crested, rose.
Cabbage Provence, rose.
Coup d'Hebe (pillar), bright pink.

YELLOW.

Persian Yellow, golden color (not fragrant).
Harrison, bright straw color.
Madam Stolz, pale straw color.
Fortune's Yellow, yellow, tinged with red—a free bloomer.

WHITE, CREAMY.

Unique, or White Provence, white.
Clementine, pure white.
Count Plater, cream color.
Bouquet (tout fait), pillar, creamy white, clustered, and very fragrant.

STRIPED.

Tout Parfait, white varied with rose and crimson; the best known striped rose.

EVER-BLOOMING AND AUTUMNAL ROSES.

THIRTY VARIETIES.

Agrippina, bright scarlet.
Giant of the Battles, glowing scarlet.
Jules Margottin, bright scarlet.
Count de Paris, bright crimson.
Prince Albert, crimson purple.
Edward Jesse, deep purplish-crimson.
Paul Joseph, rosy-crimson.
Bouquet de Flore, deep carmine.
La Reine, brilliant glossy rose color; large.
Madam Ory, bright rose; mossy.
Belmont (pillar), bright rose (a fac simile of the old China Monthly).
Prince Leon, bright cherry.

Baronne Prevost (pillar), brilliant rose color.
 Lady Alice Peel, rosy-carmine.
 Robin Hood (pillar), rosy-carmine.
 Dr. Marx, bright rosy-carmine.
 Bernard, salmon-pink.
 Hermosa, pale rose; known sometimes as the Monthly Cabbage Rose, common, but one of the finest of roses.
 Odorata, old tea-scented, light pink.
 Rivers', rose shaded with buff.
 William Griffiths, bright lilac-rose.
 Souvenir de Malmaison, pale flesh color; large.
 Madam Bosanquet, light flesh color.
 Eliza Sauvage, pale yellow, orange centre.
 Solfatarre, sulphur yellow; very fragrant.
 Lamarque, very pale straw color. (Buds, pure white.)
 Devoniensis, creamy white.
 Acidalie (pillar), white.
 Eliza Balcombe, white, blooming in clusters.
 Eponine, pure white; clusters.

Annual roses are increased by offshoots or by layers. Most of the kinds throw up the former too freely, but the Moss, the Maiden, and some other valuable kinds require careful layering in a warm, sandy soil, or in compost No. 2, which may be performed either in fall or early spring, or in June upon the young growth of the season.

Of the Autumnal and Ever-blooming Roses, all may be increased by layers; some throw up offshoots as freely as the Annuals, and the more delicate kinds may be readily raised from cuttings. Some of them are hardy any where, but others require banking with earth or careful coating with straw north of Philadelphia, and a few, as Solfatarre and Devoniensis, even somewhat south of that point. Wherever this is necessary, the best and most convenient mode will generally be to bend the whole plant down and cover it with the common earth six or eight inches deep. Open and set them into place early in the spring, and prune carefully and pretty closely.

Autumnal and Ever-blooming Roses, in order to secure the highest success in their summer and fall flowering, require to be managed with some care, otherwise their heavy spring crop of blossoms will so far exhaust them that but few will be subsequently yielded. If, however, certain selected bushes be pre-

vented from blooming in spring or early summer by plucking the incipient buds, or by deferring their winter pruning until the leaf is putting forth, and then cutting them closely back, they will probably furnish abundance of blossoms late in summer or in the fall. Transplanting or root pruning, with cutting back in the fall or very early spring, will be found conducive to the same result ; but any or all of these means should be accompanied by high compost or liquid manuring and clean and careful culture. For Running Roses, see page 484.

Rose-bushes are infested with various insects, particularly the Aphis and Scale insect, for which the remedies directed pages 264 and 265 may be used. The Rose worm or slug, larva of *Selandria* (*Blennocampa*) *Rosæ*, is still more injurious. It is a small, greenish, smooth, semitransparent worm, resembling the Cherry slug, page 275, about half an inch long, found often in June on the under side of the leaves of rose-bushes, which it eats until only the veins and the thin skin of the upper side of the leaf are left. They do not generally eat over the whole leaf, but spot it ; but in moist seasons they abound, and will then sweep the rose foliage as if fire had scorched it.

Sowing slaked lime, or dry ashes, or sulphur upon the bushes, or syringing them with weak ley or whale-oil soap may destroy the worm, but vigorous health in the plants generally prevents it.

19. ROSE OF SHARON, *Hibiscus Syriacus*, known also as *Althea*, or August Flower. Increased from layers, cuttings, or seeds.

20. SCARLET QUINCE, *Cydonia japonica* (formerly *Pyrus japonica*). Increased by cuttings of the root or by layers, and sparingly by offshoots. Extremely showy and of pretty foliage.

21. SPIREA, Reeves's, Double-blossomed, &c., *Spirea Reevesii*, *prunifolia flore pleno*, &c. A class of pretty white-flowering shrubs, spreading freely by offshoots, or increased by layers.

22. SNOWBALL, Guelder Rose, *Viburnum opulus*. An old and well-known shrub ; increased from offshoots, and still more readily by layers.

23. SNOWBERRY, *Symphoria racemosa*. A simple shrub, bearing bunches of white berries until late in the season. Its numerous offshoots become troublesome.

24. SYRINGA, *Philadelphus coronarius*, *Philadelphus grandiflora*. The former is universally known for its fragrance. The latter has larger similar flowers, but lacks odor. Increased by offshoots, layers, or cuttings.

25. SWEET-SCENTED SHRUB, *Calycanthus levigatus*. A native of the Southern States, widely known for its "apple" or "strawberry"-scented maroon-colored blossoms. Increased by offshoots, layers, and with care by cuttings.

CLIMBING SHRUBS.

TWELVE KINDS.

All the following climbing shrubs, as well as those for the green-house, may be increased by layering in the ordinary mode, or by span layering, some by offshoots, and most of them, also, by cuttings planted in a cold bed in October, and protected a little through winter, and shaded and aired through spring; or in the green-house at any time from November to April; or in a light hot bed, made for the purpose, in the spring or summer, and kept carefully watered, and shaded, and aired after the cuttings are planted.

1. BITTERSWEET, *Celastrus scandens*. A common but beautiful winding wild climber.

2. CLEMATIS, White, or Virgin's Bower, Blue, Sweet-scented, &c., *Clematis Virginica*, *cerulea*, *flammula*, &c. Slender and graceful tendril climbers; the first a hardy wild plant, the last an exotic, tender at the North, but of delightful fragrance. *Clematis Sieboldii* is a fine Japanese species, also tender.

3. HONEYSUCKLE, Scarlet Trumpet, Yellow Trumpet, Chinese Evergreen, &c., *Lonicera sempervirens*, *flava*, *Sinensis*, &c. Ornamental and perfectly hardy winding climbers; the last, *Sinensis*, being of beautiful foliage and excellent fragrance, almost an evergreen.

4. IVY, Irish, European, *Hedera Hibernica* and *H. helix*. A creeping, rooting climber, with deep green glossy leaves, sometimes planted to run on church edifices, but having, at

the North, a sorry appearance when winter has browned the foliage. It is pretty in pots as a house plant.

5. IVY, AMERICAN, or Virginian Creeper, *Ampelopsis quinquefolia*. A very fine ornamental rooting climber, growing wild over a wide region. It is often found in company with the Poison Vine, *Rhus Toxicodendron*, and not unfrequently mistaken for it, yet is easily distinguishable, each leaf having *five* leaflets, rather narrow and toothed, while the Poison Vine has but *three*, which are broader and smooth-edged.

6. JASMINE, White, Sweet, &c., *Jasminum officinale*, &c. A simple, fragrant, and pretty runner, but requires training, having neither tendrils nor other effective means of self-support. At the North it is only half hardy ; it may be laid down, and either covered with straw or banked with earth.

7. MILK VINE, Virginia Silk, *Periploca Græca*. A wild climber, with rather pretty, clean foliage and purple blossoms, abounding south of New Jersey.

8. PASSION FLOWER, Blue Hardy, *Passiflora cerulea*. A free-growing slender tendril climber, called hardy, requiring protection from the severity of winter north of Philadelphia, but springing up from the root annually, and blooming freely. Its flowers, like all of its class, are peculiar and striking.

9. ROSES, Running, *Rosa*. Belmont (see page 480); Prairie Queen, bright rose-color ; Laura Davoust, white, becoming pink ; Baltimore Belle, delicate blush, large clusters, not fragrant ; Garland, white—the well-known old white trellis Rose ; Rampant, pure white ; blooms late.

There are many other fine varieties, tender at the North, which, however, may be successfully grown if laid down for winter like tender grape-vines, and covered thoroughly with earth.

10. TRUMPET CREEPER, Common, Chinese Great Flowering, &c., *Bignonia radicans*, *grandiflora*, &c. Very strong, luxuriant-growing rooting climbers. The last is somewhat new, having large dull orange-colored blossoms. The flowers of the Common are scarlet, and more compact.

11. VINE, Grape, *Vitis*. The value of the grape as a fruit is perhaps leading us to overlook the beauty of the vine as a

climber, and to forget its fragrance, in which it is almost singular among our wild climbing shrubs. It is really one of the very finest of climbers, perfectly hardy and vigorous; and, when left to the complete *abandon* of its natural growth, there is an extreme wealth of picturesque beauty in its graceful convolutions, as well as in the profusion and richness of its diversified forms of foliage, while no perfume floats upon the summer air more delicious than the odor of its blossoms.

Its varieties, both fruit-bearing and fruitless, are numerous; and the wild, fruitless, gash-leaved vine (*Vitis riparia*) is peculiarly fragrant.

12. WISTARIA, Blue Chinese, *Wistaria Sinensis*. A perfectly hardy and very rapid winding runner, having a peculiar pair of hooks, turning backward, at each joint, which sometimes aid its ascent. It bears a perfect burden of large pendent racemes of pale lilac or blue flowers, of a peculiar and delicate fragrance, which come out before the foliage expands in the spring. The absence of green leaves with the blossoms is a drawback upon its beauty which in some localities might be obviated by arranging it so as to intermingle its growth with an evergreen, though its own foliage is fine when it appears. If the young shoots are nipped at about two feet long in June or July, a considerable second crop of blossoms will be yielded in August.

Many of these climbers may be planted to run upon trees, either deciduous or evergreen. They show finely in combination with either, but those which wind should not be set by trees while young, lest they cut in and destroy them. They may also be made to overrun rocks, or rough stone fences which it is desired to blind.

Artificial rock-work is sometimes made for ornament by throwing together loose stones or rocks in such forms as fancy dictates, and mixing with them just enough of leaf-mould and loam to afford support to small plants. For these the various kinds of Stonecrop may be used, interspersed with Columbines, Wood Anemones, &c. If it be desired to cover them, plant some of the above climbers, or Petunias, Portulacca, &c., among them. The plant known in European agriculture as Esparsette,

or Saintfoin, is also useful in this way, its flowers and foliage being quite pretty, and its roots running so that it is almost impossible to destroy them. Hops answer a similar purpose.

EVERGREEN TREES AND SHRUBS.

FOURTEEN KINDS.

1. ARBOR VITÆ, American (Savin), *Thuya Occidentalis*; Chinese, *Thuya Orientalis*; Siberian, *Thuya Siberica*. All pretty evergreens, often used for hedges; but the Chinese is rather tender, and unsightly in winter.

2. BALSAM FIR, American, *Picea balsamea*. A common but fine tree.

3. BOX-TREE, *Buxus arborescens*, &c. A fine ornamental evergreen, with silver or golden striped varieties, resembling somewhat the common garden box, but of freer and larger growth, and not so hardy. Increased by layers.

4. CEDAR, INDIAN, *Cedrus deodara*. A fine drooping evergreen, growing late in the fall, and often injured by the cold of winter at the North.

5. CEDAR, RED, *Juniperus Virginiana*. Too common to be esteemed as it deserves. Good for ornamental hedges, and excellent for shelter.

6. CEDAR OF LEBANON, *Cedrus Libani*; Silver-leaved, *Cedrus argentea*. Fine trees, but of slow growth. The Cedar of Lebanon is, however, worthy of cultivation for its associations. Its seeds are borne in fine large cones.

7. COTONEASTER, Small-leaved, *Cotoneaster microphylla*. A small, pretty shrub. Increased by layers.

8. HOLLY, American, *Ilex opaca*; European, *Ilex aquifolium*. The European Holly has a very deep green foliage, and the variegated kinds are pretty and desirable wherever the winters are not too severe. They are grafted upon stocks of the green varieties, generally by tongue-grafting, a little extra care being used in the operation.

9. MAHONIA, Holly-leaved, *Mahonia aquifolia*. A showy shrub three or four feet high, especially gay in the fall, but having its foliage injured in the winter at the North, unless covered from the sun. Increased by layers.

10. PINE, White or Weymouth, *Pinus strobus* ; California, *Pinus Benthamana* ; Grand Pacific, *Pinus Lambertiana*, often grows two hundred feet high ; Long-leaved, *Pinus larico* ; Nut, *Pinus cembra*, growing only fifteen to twenty feet, having a large cone with edible seeds.

There are many other varieties of Pines, several of them new and very beautiful.

11. SPRUCE, Hemlock (common Hemlock), *Abies Canadensis* ; Norway, *Abies excelsa*. Among the noblest of evergreen trees. The former, when tasseled with its young spring growth, is peculiarly beautiful.

12. JAPAN DOGWOOD, *Euonymus japonicus*. Pretty, but tender at the North. Increased by offshoots, layers, or cuttings.

13. LAUREL, *Kalmia latifolia*. The beautiful wild Laurel of our woods, which, as it disappears before cultivation, should be transferred to the lawn and garden. Its unfading greenness, and the composition of its blossom-tuft by the union of an indefinite number of star-like flower-buds, each perfect in itself, render it by no means an inappropriate floral emblem of our national Union. They thrive in leaf mould, or peat, or sweetened swamp muck. Increased by layers or seeds.

14. ROSE BAY, Catawba Rose Bay, *Rhododendron Catawbiense* ; Great Laurel or Larger Rose Bay, *Rhododendron maximum*. Fine flowering wild swamp shrubs, requiring, when cultivated, some shade and moisture. Increased by layers, and sometimes by seeds, and are well suited with the soils above directed for *Kalmia*.

SHADE AND ORNAMENTAL TREES.

TWENTY-FOUR KINDS.

Almost all our shade and ornamental trees, as well as shrubs and evergreens, may be raised from seed by those who have patience to wait for their growth.

If possible, the drying and storing of their seeds should be avoided. All those which are naturally shed in the fall, as chestnuts, acorns, maple and ash "keys," &c., should either be sown in the fall, or mixed with earth and buried out of doors until spring ; and those which usually retain their own

covering until spring, as the Catalpa, the Hemlock, the various Pines, the Locust, the Tulip-tree, &c., may be sown at the Pines, the Locust, the Tulip-tree, &c., may be sown at the earliest opening of spring directly from the tree, or may be collected in the fall or winter, and kept in their pods or cones till wanted.

Some seeds of trees and shrubs are difficult to sprout, as the Locust and some others, which, when not sown until spring, are benefited by being first scalded by pouring hot water upon them while stirred, and suffering them to cool. Others, as the seeds of the Rose and the various berry-bearing Thorns, require to be sown or buried in their first season, but do not vegetate until the second year.

Evergreens are apt to be extremely feeble when they first spring from seed, and require special care. All the seedlings, whether of evergreens or deciduous trees, should be transplanted and mulched carefully at one or two years old, and subsequently every third or fourth year, having their roots shortened at each removal, to prepare them for final setting out. See page 492.

FORMING AND PRUNING.

The proper formation and pruning of the head of young shade and ornamental trees is of great importance. We do not look for our return in fruit, but in beauty from these, and if the main limbs are permitted to start at acute angles, so that as they enlarge they will touch and rub, the tree, when of full size, or before, will become diseased, and liable to be split in pieces by a single gust of wind. It may be well to bolt them strongly when they begin to crack, as is sometimes done to save fine shade-trees in our city streets, but it is much better to prevent the necessity for such a course. You may do what you will with them while they are young. Never, therefore, let the principal branches spring as the fingers spring from the palm, but compel them to put forth rather as the arms stand out from the shoulders when the hands are raised above the head.

Except in the case of the grape-vine, it is not common to attempt to combine profit with ornament in tree-planting, yet certainly many varieties of fruit-trees are highly ornamental,

and some of them are also, on various accounts, well suited to the lawn. Among others, that bearing the rather small, pretty sweet apple, called by Duhamel the "*Pigeonnette*," which is a beautifully-formed tree, with clean, expanding arms and free habit, and, though the fruit may be kept into winter, yet it begins to ripen early, and is admirably adapted to the use of children, as it falls gradually from the tree.

Along our country roads, too, fruit-trees might to some extent be properly planted, not only for ornament, but use, to be reckoned, like our wild fruits, as common property.

Besides those named above, our woods furnish a great variety of fine ornamental trees, which are easily obtained. The Chestnut, *Castanea Americana*; the various Oaks, particularly the White Oak, *Quercus alba*, and the Rock Oak, *Quercus montana*, both yielding also solid and useful timber; the American Linden or Basswood, *Tilia glabra*; the Wild Cherry, *Prunus Virginiana*; the Hop Hornbeam or Ironwood, *Ostrya Virginica*; the Shad Flower, *Aronia botryapium*, and many others, which the following list does not include.

1. ASH, Weeping, *Fraxinus pendula*. A curious and pretty ash, readily increased by side grafting upon the common kinds.

2. BEECH, Copper-colored or Purple, *Fagus purpurea*; Red, *Fagus ferruginea*; Common, *Fagus sylvatica*. The two latter are common in our woods, and are clean and beautiful forest trees. The first, which is curious, may be grafted upon them by tongue or side grafting.

3. BIRCH, White, *Betula alba*; Red, *Betula rubra*; Yellow, *Betula excelsa*; Paper, *Betula papyracea*. All common, abounding, and beautiful.

4. CATALPA, or Cigar-tree, *Catalpa syriacifolia*. A fine flowering tree, easily raised from seeds sown in the spring.

5. CHERRIES, Large Double-flowering, *Cerasus sylvestris pleno*; Weeping, *Cerasus vulgaris semperflorens*. May be grafted on any common kind.

6. CHINESE KOLREUTERIA, *Kolreuteria paniculata*. A pretty tree, with a profusion of yellow blossoms in the latter part of summer. Increased by layers.

7. DOGWOOD, *Cornus florida*, Common Dogwood ; *Cornus sericea*, Red Osier. Both pretty, and easily obtained from the woods.

8. ELM, *Ulmus Americana*, &c. There are many varieties, all ornamental and some fanciful. Increased by seeds, layers, or by grafting one kind upon another.

9. GOLDEN CHAIN, *Cytisus laburnam*. A small tree, of pretty foliage and rather weeping habit, bearing large racemes or hanging bunches of golden-yellow flowers. It is a universal favorite. Increased by seeds.

10. HORSE CHESTNUT, *Æsculus hippocastanum*. A very fine ornamental tree, blooming freely. The Buckeye, *Æsculus glabra*, is a rather smaller and more compact-growing kind. The Rubicunda is a red-flowering variety. The two former are increased from seed, and the latter may be grafted upon them.

11. LARCH, *Pinus larix*. An exotic deciduous Pine, near akin to the Tamarack or Hackmatack and the Red Larch of our swamps, but thought by some to be prettier. Increased from seeds.

12. LOCUST, Rose-colored, *Robinia hispida* ; Flesh-colored, *Robinia viscosa*. Both of these are pretty, the former especially so when grafted high upon the common locust. Increased by offshoots. *Robinia pseudacacia* is the common but beautiful and fragrant Locust-tree. Increased by seeds, or offshoots, or root cuttings, which can easily be transported to almost any distance.

13. MAGNOLIA, *Magnolia glauca*, Beaver-tree, Swamp Laurel ; *Magnolia acuminata*, Cucumber-tree ; *Magnolia tripetala*, Umbrella-tree ; *Magnolia grandiflora*, Big Laurel, Magnolia. All these are found in swamps or woods south of New York, the last being the large fragrant Magnolia of the South. There are also several fine kinds from China, where it is called the Lily-tree. Of these, or seedlings from them, *Magnolia conspicua* and *Magnolia Soulangeana* are large-flowering showy varieties, blooming before the foliage appears. All are increased by layers, and most of them by seeds. They may also be grafted on the common varieties.

14. MAPLE, Red, *Acer rubra*; Sugar, *Acer saccharinum*; Larger, *Acer major*. The latter is the European Sycamore, the two former well-known and favorite shade-trees. All increase rapidly from seeds.

15. MOUNTAIN ASH, *Sorbus* (or *Pyrus*) *aucuparia*. A tree of pretty growth and foliage, bearing numerous white blossoms, like the Elder, from which large bunches of berries are produced, that become of a shining orange-scarlet color in the fall. Increased by seeds or common and hill-layers.

16. MULBERRY, *Morus rubra*. Common Red Mulberry of the woods. A desirable tree, where the fruit-stain may not be objectionable. The Paper Mulberry somewhat resembles it in growth, but soon becomes a nuisance from its numerous offshoots. *Morus Multicaulis* is also well known, and, by some, still better remembered. Increased from layers, or offshoots, or seeds. Ranks among fruits. See page 358.

17. PAULOWNIA, Japanese, *Paulownia imperialis*. A fine, rapid-growing shade-tree, with heart-shaped leaves, which, upon young growth, sometimes measure two feet across. Its blossom-buds are formed in the fall, in spikes, each bud being inclosed in a fawn-colored covering of finer texture than the finest doeskin cloth, but are often killed by the winter north of New York. Its flowers, which are put forth before the foliage, are not unlike those of the Catalpa in general form and style of growth, but are of a fine light blue, and very fragrant. Increased by offshoots, hill-layers, and cuttings of the root.

18. PEACH, Double Blossomed, *Persica vulgaris pleno*. A very pretty pink rose-like flower is borne by this tree in the usual profusion of peach blossoms, and sometimes three or four angular fruit are produced from one blossom. Increased by budding on peach or plum stocks.

19. PEPPERIDGE, *Nyssa villosa*. A common tree, but very ornamental, both in its summer growth, and when the frost makes its leaves vermilion colored in the fall. Readily obtained from the woods. It would make ornamental hedges of great beauty.

20. PRIDE OF INDIA, *Melia azedarach*. A splendid flowering tree of the South, with large divided leaves, and clusters

of fragrant lilac flowers at the extremities of its branches, well known in the latitudes to which it is suited. Increased freely by seeds or layers.

21. SASSAFRAS, *Laurus sassafras*. A sweet, aromatic, and pretty tree, worthy of a place wherever ornamental shrubs are planted. Increased by layers, offshoots, or root cuttings. It can be obtained from the woods.

22. THORN, *Cratægus, coccinea, pleno*, Double Scarlet Hawthorn. A very delicate and pretty deep pink or scarlet flowering thorn. Increased by grafting on the common Hawthorn.

23. TULIP-TREE, Whitewood, *Liriodendron tulipifera*. One of the noblest and most beautiful of flowering trees, often covering itself with its green and orange blossoms. When not crowded its head forms a handsome cone, but in the woods it sometimes runs a clean column eighty feet high. Increased by hill-layers or by seeds, which seldom vegetate until the second year.

24. WILLOW, Weeping, &c., *Salix Babylonica*, &c. The Weeping Willow, the Golden Twigged, and the Golden Flowering Willows, and other varieties, are quite ornamental. The Osier Willows form an article of commerce. In Belgium they are sometimes so planted as to be mowed from year to year.

REMOVING ORNAMENTAL TREES, EVERGREENS, &c.

Ornamental or forest trees or shrubs and evergreens very often fail to live when removed, and still oftener only just live and linger along, making but feeble growth for years. To prevent this, and secure vigor as well as life after removal, some preparation is desirable. In all well-managed nurseries this preparation is given by repeatedly transplanting trees of this class, shortening their roots from time to time, so as to limit the growth of single strong roots, and increase and concentrate fibrous ones around the collar and the short main roots proceeding from it. If we do not form a nursery, but take trees from the woods and swamps, we may meet the difficulty either by removing them in the winter with *large* masses of frozen earth, or by cutting clean around the trees we intend to remove two or three years before transplanting them, cutting off the

horizontal roots at such a distance as may seem judicious, and, if we find but few of these, proceed farther and open the trench, so that the downward roots may be partially or wholly cut off. Repeat and perfect the operation in the following year or years, and, if it has been skillfully performed, your tree may be removed without difficulty in the fall or spring of the third or fourth year.

If the subsoil be such that you know the roots do not go far down, as is common in swamp trees, the root-cutting may be effected by a single deep cut with a spade around the tree as directed for root-pruning, page 255.

In preparing trees for transplanting by cutting round them, or in their actual removal, it will be found a good general rule to make the diameter of the ball of earth in the proportion of one foot to one inch diameter in the stem of the tree at a foot above the collar.

In removing trees, other than evergreens, from the woods, it is of great practical importance to prune them closely at the time of transplanting, cutting away from their heads from one third to one half the weight, carefully shortening and opening them. All the climbing shrubs so transferred will be benefited by being cut down to the ground, so that the growth of the plant may be entirely new. The same is true of most varieties of bush shrubs, particularly the Azaleas, Wild Roses, and the Laurel (*Kalmia*), which, though an evergreen, is in this respect an exception to its class.

This process is not to be rigidly applied to those plants which we select for the sake of their stems already formed, but it will be found good for most kinds and individuals from the woods, and very often, also, nursery plants, particularly if they have been over-forced, or are transplanted when in leaf and wilt upon your hands, or from any cause are weakened before being reset. It also relieves from the necessity of seeking for handsome plants, as they will grow naturally, and therefore prettily, when, having sufficient room, they grow anew.

Evergreens appear to suffer and exhaust with the winter. Early spring is the season of their peculiar weakness, and if removed carelessly or harshly then, there is little hope of them.

They should, therefore, always either be removed in the winter, with the frozen earth about them, or be so prepared as that their fibres will hold and carry with them sufficient earth to secure success. It will also be found better, in general, to defer their removal until late in spring, say to the last of April or May, and sometimes even to June, or still later.

CHAPTER XXII.

Brief Notes on Farm Crops, with Table of Quantities of Seed required per Acre.—Crop estimated by its Money Value, and by its Capacity to support Animal Life.—Table of average Product of various Farm Crops, and of their chemical Constituents.—Remarks explanatory of the Table.

BRIEF NOTES ON FARM CROPS.

QUANTITY OF SEED.

THE quantity of seed which it may be desirable or expedient to sow upon an acre varies materially with the particular kind, the state of the land, or the period of the season at which it is sown. The relative size of the seeds, say the number they will count to the peck, with the mode of plant-growth, as branching or otherwise, allowing a little for increased risk of loss in small seeds, generally determines the first point.

Of the grains, buckwheat is usually sown thinnest, and needs to be varied only as on poor or rich land; but, contrary to the general rule with other grain, it should be sown thicker on rich land than poor, for the reason that it will otherwise branch considerably, and be difficult to cradle without loss; while, being more thinly sown on poor land, it will still yield as much as the soil is capable of producing. Winter grain sown early, or at least seasonably, may be sown thinner on rich land than on poor, because on the former it will grow and branch vigorously, and it is plain that one bushel of seed, giving two ears from a plant, is equal to two bushels giving only one ear; but on poor land the plant will not branch much, and it is therefore desirable to increase somewhat the quantity of seed sown. Very late-sown winter grain, and all spring-sown grains, often lack opportunity to branch and strengthen before they are driven up to seed by the prompt warmth of the opening spring, and on this account they should be sown more thickly than might otherwise be necessary, due allowance, however, being still made for the different condition of the land on which they may be sown.

In respect to grasses, there is an advantage in thick sowing; this is not found in a materially increased burden of grass in favorable circumstances, but in the promptitude with which the young plants preoccupy the whole ground and prevent the growth of weeds, which, in thin sowing, would be apt to dispute possession. In this view of the matter, the fact that half the young grass-plants are afterward smothered by those which take the lead in growth is entirely unimportant.

From what has been said above, the following table will be understood as embodying suggestions rather than rules in reference to this subject. For manner of sowing, see page 82.

For seeding down grass-plot or lawn, a mixture of grass seeds should be used, say equal parts by weight of Red-top and Blue Grass, adding White Clover in the proportion of one sixth of the whole, and half as much Sweet Vernal Grass as Clover. If the land be wet, Timothy may be substituted for the Blue Grass in part or wholly. The grass upon a plot or lawn should never be suffered to go to seed, but should be regularly and closely mowed when from four to six inches high, or even while still shorter. (See also pages 82, 85.)

TABLE OF QUANTITIES OF SEEDS, ETC., REQUIRED TO SOW OR
PLANT AN ACRE.

Corn planted in hills.....	1 to 1½ pks. per acre.
“ drilled for fodder.....	4 to 6 “ “
“ sown broadcast.....	8 to 12 “ “
Wheat sown broadcast.....	4 to 8 “ “
Rye “ “.....	4 to 8 “ “
Barley “ “.....	6 to 10 “ “
Oats “ “.....	8 to 12 “ “
Buckwheat sown broadcast.....	3 to 6 “ “
Peas drilled.....	4 to 6 “ “
“ broadcast.....	12 to 16 “ “
Bush Beans drilled.....	4 to 6 “ “
“ broadcast, if so sown at all.....	10 to 12 “ “
Rice drilled.....	8 to 10 “ “
Millet broadcast.....	3 to 5 “ “
Red Clover alone.....	16 to 20 lbs. “
“ “ with Timothy.....	8 to 12 “ “
Timothy alone.....	12 to 20 qrts. “
“ with Red Clover.....	8 to 10 “ “
Red-top alone.....	12 to 20 “ “

Red-top with Red Clover.....	8 to 10 qrts. per acre.
Blue Grass	} for special purposes or particular localities
Rye “	
Orchard Grass	10 to 25 lbs. “
White Clover to be added to either of the above...	2 to 4 “ “
“ “ if for any reason sown alone	4 to 6 “ “
Broom Corn drilled	4 to 6 qrts. “
Flax drilled	4 to 6 pks. “
Potatoes, varying very much, as being in hills or } drills, small or large, cut or uncut. See p. 171. }	6 to 20 bush. “
Ruta Baga drilled or broadcast	} 1 to 1½ lbs. “
Common Turnips drilled or broadcast	
Beets drilled	2 to 4 “ “
Carrots drilled	1½ to 2 “ “
Parsneps “	2 to 4 “ “
Onions “	3 to 5 “ “
Cabbages: ½ lb. of seed, if thinly sown, and escaping the fly, will yield an abundance of plants for one acre.	

ESTIMATE OF CROP.

Crop, or that return for our outlay of manure, and seed, and labor, which is derived from land, may be estimated either by its money value or by its capacity to supply the wants of animal life. If estimated by the former, which always depends on the relation of supply and demand, it is manifest that it will be liable to fluctuation from a great variety of causes: the variations of seasons, difference of localities, failure or superabundance of the same crop, or any similar class of crops, in other sections or countries, &c. Any of these may so affect this relation that a rich crop will give but a poor return in money, or that a very moderate crop may prove extremely profitable; the very abundance of the yield in the former case, whether from natural or artificial causes, rendering the product almost valueless, when the extra labor of gathering and marketing the excess is taken into account.

In general, perishable products, as fruits and vegetables for consumption in the current season, are most promptly and largely affected by this cause; but, in a degree, grain, and the various dry products that admit of being kept, obey the same immutable law, and fluctuate, often to the disappointment of the farmer's hopes or the ruin of the miscalculating speculator.

The lesser or greater distance from market also affects this

estimate. It may be very profitable to raise carrots, or egg-plants, or celery near large cities where there is a daily demand for them, while the expense of their transportation from a distance, with the attendant risks, would reduce them to the ordinary standard of farm crops.

A difference of latitude of even less than one degree may occasion an entirely opposite result from the same crop in the same season. Early peas, or potatoes, or fruits, raised thirty or more miles south of a given market, securing the highest price, because maturing at the opening of the season; while those raised at an equal distance to the north, or such crops of late kinds raised at the South, obtain the lowest price, because coming in when the market is glutted with similar products from more favorable localities.

The mere money estimate, moreover, may or may not be at all dependent on any intrinsic capacity in the product to support animal life; even things that are almost utterly destitute of this may become largely profitable, as coffee, from the fact that it furnishes a pleasant beverage; or as tobacco, which, in its various forms, ministers chiefly, if not entirely, to a vitiated taste.

If the estimate be formed upon the basis of the capacity of the crop to sustain animal life, which really would seem to afford some fixed principles as criteria of its intrinsic value, one might suppose that with a little experience in the cultivation of a particular soil, with the gathering and feeding out of its crops, and a little observation of the climate in which we live, it might be safely and pretty accurately made. But not only does the adaptation or non-adaptation of soil and general climate to particular crops modify this estimate of it, but also the character and changes of particular seasons whose current climate may be favorable or unfavorable; thus hay the growth of a moist, warm, rapid season, is comparatively poor—in common phrase, it “does not feed out so well” as that which is raised in a drier and less growthy spring. It is also affected by the course of cropping pursued and the character of the manures applied to the land. All vegetable products show by analysis chemical differences in various lots of the same kinds of crop,

which may arise either from the absence of one or more elements from the soil, necessitating the appropriation of others as substitutes, or from the simple excess or deficiency of a given ingredient in such soil inducing a corresponding excess or deficiency in its appropriation by the growing crop.

In order to ascertain correctly the comparative value of various crops for supplying the wants of animal life, we need, in addition to chemical analyses, carefully-performed and repeated experiments in feeding with the products, noting their effects upon health, with temperature, age of animals, and other circumstances. No knowledge of constituents, however perfect, will suffice, for these, even when rich, often become of little use from lack of adaptation in the form in which they are presented. Thus dried tea and cabbage leaves are chemically almost as rich in protein compounds as beef, but could hardly be made to supply its place. The corn-stalks from an acre contain generally more food than the corn, but in a form not well adapted to consumption, even by cattle, and on this account should always be cut up short and steamed for feeding.

Such experiments as those above referred to should of course include the cost of production in a given locality or climate, for it is plain that a crop may be so costly in its production, owing to climate or other causes, that it would become the part of wisdom to prefer another, though much lower in the scale of gross value, on account of its higher nett results. In New York Sugar Beets would pay better than Sugar-cane.

Though we have by no means full and reliable information upon all the points involved in this matter, yet, from the various experiments and analyses which have been recorded, it is possible to form such a judgment in the case as may be useful. We may approximate to a satisfactory estimate of the actual and relative value of any ordinary crop, on the whole, in the particular soil and climate in which we labor, a very brief experience supplying us with the local data necessary to an intelligent application of the tests which the appended table of products and their constituents furnishes.

TABLE OF QUANTITIES AND CHEMICAL COMPOSITION OF VARIOUS CROPS,
OF CONSTITUENTS, AS TO FURNISH DATA FOR CAL-

	DIVISION 1.		DIVISION 2.			DIVISION 3.		
	Amount of product per acre.		Water.			Vegetable fibre.		
	Approximate average product per acre in bushels or tons.	Approximate average product per acre in pounds.	Variations in percentage of water in divers analyses.	Probable average percentage of water.	Total weight of water in product per acre in pounds.	Variations in percentage of vegetable fibre in divers analyses.	Probable average percentage of vegetable fibre.	Total weight of vegetable fibre in product per acre in pounds.
Corn	30 bush., at 58 lbs.	1,740	11½ @ 15½	12½	217½	4 @ 15	12½	217½
Corn-stalks ..		2,500	12 @ 15	12½	312½	25 @ 40	33½	833½
Wheat	20 bush., at 60 lbs.	1,200	10 @ 17	12½	150	12 @ 16	12½	150
Wheat Straw ..		2,400	12 @ 15	12½	300		50	1200
Rye	20 bush., at 56 lbs.	1,120	12 @ 15½	12½	140	5 @ 10	8½	95½
Rye Straw ..		3,000	12 @ 15	12½	375	40 @ 50	45	1350
Barley	30 bush., at 48 lbs.	1,440	14 @ 15½	12½	180	8 @ 15	12½	180
Barley Straw ..		1,500	12 @ 15	12½	187½		50	750
Oats	40 bush., at 32 lbs.	1,280	9 @ 16	12½	160	3 @ 20	20	256
Oat Straw ..		2,000		12½	250	40 @ 45	45	900
Buckwheat ..	25 bush., at 48 lbs.	1,200	12 @ 16	15	180	14 @ 27	20	240
Peas	20 " at 60 "	1,200	12 @ 15½	12½	150	3½ @ 10½	7½	90
Bush Beans ..	20 " at 60 "	1,200	11 @ 20	15	180	6½ @ 10	8	96
Rice	25 " at 70 "	1,750	15 @ 18	15	262½	8½ @ 5	4	70
Millet	50 " at 50 "	2,500		12½	312½		20	500
Clover Hay ..	2 tons.	4,000	12 @ 14	12½	500		25	1000
Meadow Hay ..	1½ "	3,000	12 @ 14	12½	375		30	900
Potatoes	200 bush., at 60 lbs.	12,000	68 @ 80	75	9,000	2 @ 10	3 (?)	360
Ruta Baga ..	10 tons.	20,000	80 @ 87	85	17,000		3 (?)	600
Common Turnips }	10 "	20,000	85 @ 93	90	18,000		3 (?)	600
Beets	10 "	20,000	80 @ 90	85	17,000		2 9-10 (?)	580
Carrots	10 "	20,000	80 @ 88	85	17,000		3 (?)	600
Parsneps	10 "	20,000		76½	15,300		5	1000
Cabbages without the stalks }	20 "	40,000	88 @ 93	90	36,000		1½	600

ESTIMATED AT SUCH RATES OF PRODUCT PER ACRE, AND SUCH PERCENTAGES CULATING THEIR ACTUAL AND RELATIVE VALUES.

MATERIAL FOR RESPIRATION AND FATTENING.						MATERIAL FOR MUSCLE OR LEAN FLESH.			MATERIAL FOR BONE.		
DIVISION 4.			DIVISION 5.			DIVISION 6.			DIVISION 7.		
Oily Matter.			Carbonaceous elements other than oily matter, comprising sugar, honey, starch, dextrine, or gum, &c.			Nitrogenous elements known as "Protein compounds," comprising gluten, casein, albumen, legumin, avenin, &c.			Saline or inorganic elements, comprising earths, alkalies, and metals, usually or always combined with acids.		
Variations in percentage of oily matter in divers analyses.	Probable average percentage of oily matter.	Total weight of oily matter in product per acre in pounds.	Variations in percentage of carbonaceous elements other than oily in divers analyses.	Probable average percentage of carbonaceous elements.	Total weight of carbonaceous elements other than oily in product per acre in pounds.	Variations in percentage of "Protein compounds" in divers analyses.	Probable average percentage of "Protein compounds."	Total weight of nitrogenous "Protein compounds" in product per acre in lbs.	Variations in percentage of saline or inorganic elements in divers analyses.	Probable average percentage of saline or inorganic elements.	Total weight of saline or inorganic elements in product per acre in pounds.
3 @ 12	7½	130½	50@80	60	1044	5 @ 14	6½	113	1 @ 1½	1	17½
1 @ 1½	1	25	50+	42½	1066½	3 @ 10	4½	112½	4 @ 6	8	150
2 @ 4	2½	30	55@75	58	696	10 @ 16	12½	150	1.2 @ 2.3	2	24
½ @ 1½	1	24	.....	25	600	.....	1½	36	3½ @ 15	10	240
2 @ 3½	2½	28	60@78	63	705½	10 @ 15	12½	140	1.03 @ 1.04	1	11½
.....	½	15	.....	37½	1125	.....	1½	45	2 @ 3½	3	90
2 @ 2½	2	28½	55@68	60	864	10 @ 14	10	144	3 @ 18	3	43½
.....	½	7½	.....	31(?)	465	.....	1½	22½	4 @ 5½	4½	67½
3 @ 6½	5	64	40@70	45	576	13 @ 19½	14	179½	2½ @ 4	3½	44½
.....	½	10	.....	35	700	.....	1	20	5 @ 7½	8	120
.....	½	8	50@65	49	588	10 @ 16	12½	150	.....	8	36
2½ @ 3	2½	30	50@62	50	600	16 @ 26	25	300	2½ @ 3	2½	30
2 @ 3	2½	30	30@50	43	516	19 @ 28	28	336	3 @ 4½	3½	42
½ @ 2½	½(?)	8½	75@86	75	1312½	3½ @ 6½	4½	78½	½ @ 1	1	17½
.....	½(?)	12½	.....	45	1125	19½ (?)	18½(?)	462½	.....	3½(?)	87½
3 @ 4	3½	140	.....	40	1600	.....	9	360	5 @ 10	10	400
2 @ 5	3	90	.....	40	1200	.....	7	210	1½ @ 5½	7½	225
1-12 @ ½	½	30	10@20	18	2160	½ @ 2½	2½	270	1 @ 2	1½	180
.....	(?)	(?)	.....	10	2000	.....	1	200	½ @ 1½	1	200
.....	(?)	(?)	.....	5	1000	.....	½	100	1 @ 2½	1½	300
.....	1-10	20	.....	9	1800	.....	2	400	.....	1	200
½ @ 2-5	½	50	.....	8½	1650	.....	2	400	1½ @ 2½	1½	300
.....	(?)	(?)	.....	13½	2700	.....	2	400	1 @ 4	3	600
.....	1-10(?)	40	.....	62-5	2560	.....	1½	600	.....	½	200

This Table has been prepared with considerable care and labor, but I have not thought it worth while, to name the authorities consulted and compared ; they include most of the French, German, English, and American chemists, whose various analyses of farm products constitute the active capital of writers and speculators upon the subjects to which they relate.

The Table is not assumed—indeed, was not intended to be, and could not be made absolutely accurate, but it is believed to come so near to the true standard that, with the explanations given, no one is likely to be deceived by it ; and the author will be happy to receive any suggestions by which it may be made more useful, and give them a place in a future edition, should such be demanded.

I have not included in it the recently-introduced Chinese Sugar-cane, or *Sorghum saccharatum*, because that, so far as I am advised, no perfect and reliable analysis of it has yet been made, nor have statements of its average yield of sufficient accuracy and extent yet appeared to form the basis of a conclusion respecting it. From experiments made with it, however, in various sections, it seems likely to prove valuable for fodder ; and if it should be found impracticable to extend the culture of the Sugar-cane sufficiently to meet the growing demand for its products, persistent efforts will doubtless be made to devise means for the production of sugar from this very juicy crop. It may be cultivated in hills or rows, as corn, and for a fodder crop it has the advantage of a small and easily-sown seed.

The Chinese Potato, or Yam, *Dioscorea Battatas*, has been omitted on account of its sheer worthlessness.

EXPLANATORY REMARKS.

Of the particular quantities given in the first division as representing the product of an acre, corn may be regarded as quite low, and oats, millet, potatoes, cabbages, and the root crops as rather high. For the latter I have taken the average of the English turnip crop, which, according to Johnston, is ten tons per acre, though in common turnips we never approach this, and very rarely in Ruta Baga or the other root crops. It is seldom, too, that twenty tons of cabbages are

raised upon an acre, yet it is quite possible to obtain this quantity; but upon the land that would produce it, twice, or even thrice the weight of corn and stalks named in the table might be raised, and harvested at less than half the risk and labor. I have purposely made the average of corn and stalks very low, because of my entire conviction of the immense superiority of the corn crop over all root crops in our climate. The average of corn in the table must at least be doubled to make the comparison a fair one with the last six articles. I have endeavored so to arrange the percentages adopted that any one can with ease calculate the value of a larger or smaller product per acre of any crop given.

Divisions 2 and 3, Water and Vegetable Fibre, represent constituents of the crop which in ordinary cases simply add to its bulk. As vehicles of food, or mingled with it, their mere bulk aids digestion, and thereby promotes health, while they may also, in extreme cases, become, to a certain extent, available as nutriment.

Divisions 4, 5, 6, and 7 (omitting the silica in the latter) contain the materials by which, in combination with water, all animal bodies are framed, covered with muscle and fat, supported in growth, their waste resupplied, and warmth and vigor given to them. The aggregate of the items in these columns indicates the true value of any crop we raise. Milk, which is the only complete and perfect animal food, contains them all (with the omission noted), mixed with more or less of water, and in proportions analogous to those of the general crops in our table, the wants of the animal economy requiring larger supplies for respiration and fattening than for muscle and bone. No one of them, however, could be dispensed with or ignored. With No. 7 the bones might be formed, and by the aid of No. 6 be bound in their places and work, as puppets are worked with cords, but must remain angular, and cold, and of themselves motionless, unless the supplies from Nos. 4 and 5 lay a lining of soft cellulose matter beneath the skin, round the general outlines of the limbs and body, lubricate the joints, and feed with appropriate fuel the vital furnace in the lungs.

The variations in the percentages of the several constituents

given by the different chemical authorities, as shown in the table, are very striking.

Those in the water and vegetable fibre, divisions 2 and 3, may probably have arisen from actual differences in the dryness of the articles analyzed, or in the amount of their exterior coating, as might very naturally occur in several of the grains.

Those found in the percentage of oily matter, division 4, may perhaps be accounted for by supposing the analysts to have experimented upon different varieties of the same crop; thus, to take Corn as an example, it is perfectly comprehensible how neither Liebig nor any other chemist could find even five per cent. of oily matter in our light flour Corns, which seem to resemble Buckwheat in their character, while Dumas and others might readily obtain nine or ten per cent. from a strong northern yellow Flint Corn.

This division properly belongs with No. 5, the elements in both being carbonaceous, but I have given the oily matter a separate division, because, as the ready-formed fat in food is most easily appropriated, and, withal, renders important aid in digestion, the amount of this material found in a given crop affords a measurable test of its relative value in the fattening of animals.

The differences found in the percentages of the other carbonaceous and the nitrogenous elements, divisions 5 and 6, may be due, in part, to the same cause as those of the oily matter, but probably still more to differences of character and quality, independent of variety of stock, arising from differences in the feeding and culture of the particular crops from which the specimens were derived. The manure from a barnyard that is very thoroughly leached into the neighboring brook will not have much material to give stamina and richness to the crop to which it is applied; and if, in addition to this, the season's culture be slighted, a crop relatively rich in vegetable fibre, and poor in the more important constituents, may be reasonably expected.

The variations in the percentages of saline or inorganic elements, division 7, may be traced to the same or analogous causes. It is well settled that plants, like animals, feed not

always upon that which is most desirable and proper, but upon what can be had in their season of need. If, therefore, the rains have carried off the elements of this and the two preceding divisions from the barn-yard, and they have been previously largely cropped out of the soil and sold off without return to the land, no grand and heavy crop can be expected.

Under the general terms saline or inorganic elements are included, in very various proportions, Silica or Flint, Lime, Magnesia, Alumina, Potash, Soda, metallic Oxides, Phosphoric and Sulphuric Acids, Chlorine, and a few other constituents; and, though their aggregates, as shown in this division, are small as compared with those of Nos. 5 and 6, yet they are, more or less of them, essential to every crop, and can not be taken by the plant from the atmosphere, whence much of the material for the others may probably be derived. Hence this division becomes of special importance, showing as it does the total amount of the privation which land sustains by the loss of these elements in a given crop.

By far the greater portion of these aggregates, however, are derived from about one half of the elements named above. Of the 24 lbs. of inorganic matter given in the table as obtained from the product of an acre of wheat, about $8\frac{1}{2}$ lbs. may be Silica, 2 lbs. Lime, 2 lbs. Magnesia, $4\frac{1}{2}$ lbs. Potash, and 5 lbs. Soda; and of the 240 lbs. yielded by the straw, about 189 lbs. may be reckoned as Silica, 16 lbs. Lime, 2 lbs. Magnesia, $1\frac{1}{4}$ lbs. Potash, and 2 lbs. Soda, with some 10 lbs. Phosphoric Acid; the small remaining balance in both being composed of minute portions of the other elements. The large predominance of silica and lime is a remarkable feature in this division, and may illustrate the natural law by which supply and demand are regulated in the vegetable and animal kingdoms. Without the silica, neither corn, grain, nor grass would stand upright to maturity; it forms the outer coating and strengthener of the stem of these and certain other plants, and may, without impropriety, be said to furnish to them the bones of vegetable growth, while it is almost entirely wanting in the stout angular stems of the Horse Bean, *Vicia faba*. The lime is equally essential to the formation and strength of

animal bones, of which it constitutes so large a part. Extraordinary means are sometimes used to supply the lack of it when the bones are in the forming state; thus the peasant mothers of Germany are said to give lime-water to their young children; and when, in raising calves by hand, milk is economized by the use of hay-tea, &c., it is a custom, which I think is immemorial, to make up the great defect of the infusion by giving them chalk to lick, with which they instinctively supply the necessities of the animal economy. From the multiplicity of these saline or inorganic constituents of vegetables and their importance, although many are minute in quantity, it is apparent that very light applications of such manures as are rich in these elements may be of essential service to the crop.

A glance at the table shows that hay, and stalks, and straw contain more of saline or inorganic matters than is found in the grains, and the same is true of the vines of peas, potatoes, &c., which are omitted; to preserve all these with care, and return them, with suitable additions, to the soil, may therefore be regarded as one of the first duties of the intelligent cultivator.

Where, as in the case of tobacco, almost the whole product is of necessity sent away, the soil must be speedily exhausted, unless the various elements contained in the crop are replaced by importation, or by taxing other crops for a supply; but, in reference to ordinary farm soils and crops, the case is somewhat different. The elements contained in the various crops above enumerated may all be replaced, and the general condition of the farm progressively improved by the accumulations of a well-managed barn-yard, with the use of ashes, gypsum, marl, and swamp-muck treated with lime, where these are obtainable; but especially may this be effected by the frequent and regular use of clover as green manure; this, with the application of gypsum and occasional dressings of lime, will be found the cheapest and easiest known mode of resupplying the draughts made by the various crops, and sustaining and improving the strength and productiveness of the soil.

ADDENDUM.

Forcing Vegetables and Fruits.—Training Fruit-trees.

FORCING AND TRAINING.

FORCING common garden vegetables and forcing or training ordinary fruit-trees are modes of culture not likely to be very generally adopted in American home gardens ; but, inasmuch as they may occasionally be fancied or found desirable, the following brief account of their objects and modes is introduced here as an addendum to the more valuable and important processes described in the body of the book.

FORCING.

FORCING is the general term descriptive of the various processes for raising vegetables, fruits, or flowers out of their natural or ordinary seasons or climates, by means of carefully-applied artificial heat under glass, whether in hot bed, or pit, or grapery, or orchard-house, or green-house, or dwelling.

Among gardeners, success in forcing is an object of ambition, and its honors are worn with a good deal of professional pride. Some affect to have peculiar modes of practice, which they hide carefully from others, but which are often mere worthless conceits.

It will be apparent to any observant mind that crops which in ordinary culture bear without injury the common vicissitudes of climate in the open air may easily endure the lighter and less frequent changes to which they are subjected in house or frame culture, unless a most unnatural system is pursued, or great carelessness displayed in their treatment.

The beau ideal of forcing is to create artificially a *climate* so perfectly resembling that which is natural and congenial to the plants forced as to induce fair vigorous growth and fruiting under a system of treatment not differing materially in other re-

spects from high out-door culture. To effect this the chief thing is to give incessant care to the degree of temperature and moisture which the crop may require, and so to limit the quantity of fruit permitted to set as to keep it always somewhat below the bearing capacity of the tree, of which every gardener is supposed to be capable of judging at a glance, and every cultivator may learn to judge by a few careful experiments in fruiting. He can scarcely err injuriously except on one side. If he leave an excess of fruit upon the tree, the whole crop may be injured or destroyed, but if he reduce the amount, even much below the natural or necessary line, the remaining fruit will be certainly and perhaps greatly improved, and may very possibly more than make up in its aggregate weight for the excessive thinning.

Some vegetable plants are forced for use in winter by a process of simple self-exhaustion. Their strong roots being transferred in the fall to a cellar, or hot-bed frame, or heated pit, or green-house, yield a limited crop under the stimulus of the warmth thus furnished; this being obtained, the roots thus taxed are either thrown away or set out again in the spring to regain their ordinary strength. Sea-kale, Asparagus, Pie-plant, Succory, etc., etc., are thus treated where it is deemed worth while.

The more common vegetables, as Lettuces, Radishes, and certain small matters for salads, require in their forced production in hot-bed frames but little if any more or different care, though longer continued, than is necessary for raising early hot-bed plants of various vegetables for setting out. See page 30.

Cucumbers and melons are often raised in unfavorable localities by a system of half forcing sometimes called "ridging." For this purpose a pit or trench of any desired length, about three feet wide and two feet deep, is dug at the close of spring, and filled with heating manure in the manner of making hot bed (see page 30), the manure being covered twelve or fifteen inches deep with surface earth well enriched with old garden compost and chopped half-rotted sod, adding sand or road-wash if the soil be heavy.

Potted plants, previously prepared in hot bed, are set out

carefully along the centre of this ridge, in hills from four to six feet apart. Set a hand-glass over each hill ; give air and culture as needed until the vines begin to run freely, then raise the hand-glasses upon bricks or blocks, that they may pass under ; nip or stop them at about two feet from the stem, that they may branch and blossom compactly ; and when the full summer is upon them remove the hand-glasses entirely, and give them ordinary but careful culture until the crop perfects.

The plants for ridging or forcing, both of cucumbers and melons, are in general carefully raised from old seed, that the vine-growth may be moderate ; or they are produced by cuttings, particularly if new seed has been sown. The cuttings are made in the ordinary manner (see page 438), and being set two or three in a pot, and placed in the hot bed with slight shade, will root in a week or so, and soon furnish strong compact growing plants, which will also, if well raised, be more hardy than those direct from seed, and less liable to "damp off," as the stem-rotting of succulent plants in a cool moist climate is called.

In those climates which discourage or forbid their out-door cultivation, they are often forced under glass, in hot bed or pit, throughout their growth and fruiting, requiring peculiar and extraordinary care in the process.

With this view the hot bed is made as directed page 30, but with ten or twelve inches' depth of earth, which should consist of thoroughly-prepared garden compost (page 63), to which an equal quantity of well-chopped and half-rotted loamy sod is added. The seeds are planted, or the potted plants set out, just under the centre of each sash ; and at the appearance of the third leaf, if they are seedlings, only the two or three best plants are left in each hill ; the surrounding vacant space, if such use of it is found desirable, can be temporarily occupied by pots, in which any kinds of early plants may be raised, to be taken away as fast as the growth from the central hill demands the room.

The most assiduous daily attention is required, to give air and tepid water as may be found needful, taking especial care to furnish both regularly but moderately, according to the va-

rying condition of the weather and the consequent necessities of the plants.

Hill them slightly as they grow, and apply light dressings of liquid manure from time to time to the hills and around them, but in these and the ordinary waterings avoid much wetting upon the stems or leaves of the plants.

As the vines extend it will become necessary to nip their points for the purpose of thickening the bearing growth, causing them to branch from near the root, and also afterward to "stop" them when they reach the sides of the frame, and, again, to prevent their becoming over-thickened by their young side branches, which must be kept thinned out when the fruit is forming or in growth; the number of fruit upon each plant must also be limited if you desire to have them fine; and when as many as you wish to have are set, nip all subsequent blossoms before they open.

The general temperature of the hot bed, or pit, should range from 60 to 80 degrees, and this range be continued as uniformly as possible. In order to secure this object, in addition to the daily care in airing, etc., it may be found necessary to "line the bed," that is, when the heat of the bed itself declines, to bank fresh heating manure to the thickness of one or two feet all around it in the same careful manner as the hot bed was built at first, repeating this operation time after time if found necessary, cutting away and removing all the old manure from the outside of the frame so as to bring the new warmth as nearly as possible into contact with the body of the bed which it surrounds; if thought needful, this lining may be raised above the level of the bed so as to reach nearly to the upper edge of the frame, with a slope to throw the water away from it in rainy weather.

When raised in a "cucumber pit," heated either with manure, or hot water, or steam, these vegetable fruits are not unfrequently trained upon trellises, being carefully and pretty closely pruned, and strictly limited to their proper space, by which system some room is gained, and the hanging fruit is also ornamental.

Almost every variety of garden vegetable may be and is

produced by forcing where the demands of luxury render the operation profitable ; but few persons will be likely to attempt to force these in a plain "home garden."

Fruits are variously forced, either in the green-house or in houses specially appropriated to them. For strawberries, steep single-pitch, narrow, temporary "strawberry houses" are often made with the glass reaching nearly to the ground. From a furnace sunk a sufficient depth at one end, a single line of stove-pipe or small brick flue, slightly raised, runs along the middle of the floor. The staging is so constructed as to cover this, and bring the plants within a foot or less of the glass from top to bottom, the whole looking like a covered strawberry bed upon a steep slope.

Grapes are more commonly than other fruits forced in the green-house ; they are, however, more successfully forced by themselves in a grapery, though strawberries in pots or otherwise may be conveniently forced with them. Peaches are also generally forced alone in "peach houses," and these, with some other varieties, are occasionally forced together in what we have called "orchard houses." For this purpose they are sometimes, though rarely, planted in the orchard house, as ordinary dwarf or low-stemmed trees, but generally trained upon upright trellises by the walls of the house, or inclined or curved ones in the body of it, and sometimes are cultivated as extra dwarf trees in pots, or tubs, or boxes.

Fruits so forced require, even more than vegetables, extraordinary and constant care in respect to temperature, moisture, air, pruning, and fruiting. The preparation of the house borders, etc., and the general course of treatment required do not differ greatly from the directions for the grapery, page 355-7.

Forced vegetables which are raised from seed, etc., are started at once in summer heat ; but in forcing fruits we seek to make a mimic spring, beginning at a low temperature, say 35 to 40 degrees, and gradually raising it at the rate of two or three degrees a week, until, by the time the fruit has set, it has gone up to 60 degrees in the day ; or at this point and onward it may rise to 70 or 80 degrees if the sunshine carry it up ; but in this case free ventilation must be given, and a hu-

mid atmosphere produced by watering or syringing, and special care be taken that after such an accession of heat the recession be not sudden. The night temperature may range uniformly about ten degrees below that of the day, the state of the house being sedulously watched, its slightest variations being indicated by a double registering thermometer.

Besides a very severe system of summer pruning, almost entirely suppressing growth, there are in fruit forcing various other nice points to be attended to, the detailed minutiae of which will be found in works specially devoted to this department of fancy culture, and these scanty general indications are all that can be given here.

The ripening of the larger fruits will generally be effected in about five months from the first application of heat.

TRAINING.

"TRAINING" is any process by which the young growth of trees or shrubs is diverted from its natural course, and made to take such directions or assume such forms as the fancy of the cultivator may prescribe. Hence the various kinds of training are designated as "upright," "horizontal," "fan-shaped," "weeping," "coiled," or "winding," etc. For illustrations of the two former see *Arbor and Trellis Culture of the Grape*, p. 349-50.

Training the larger fruit-trees upon trellises is, in general, merely a fancy mode of treating dwarf trees like the weeping cone and other peculiar forms, or it is practiced in preparing such trees for the ornamentation of path sides, etc.; but training such fruits against walls or other shelters is adopted with a view of producing in ungenial climates fruits not otherwise producible in them, or to obtain in perfection in unfavorable localities or soils certain fine varieties of fruits, which even the processes of dwarfing and summer pruning do not enable us, under the circumstances, to ripen satisfactorily. It may be practiced in either or all its forms so far as time, means, and taste permit or prompt.

Where it is proposed to cultivate "wall fruit," as the product of trees so trained is termed, the borders or holes for the

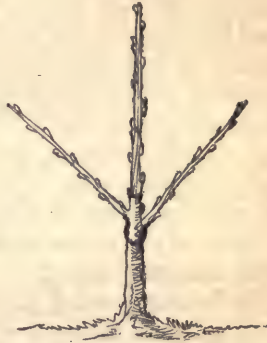
trees are prepared with more or less care and thoroughness, somewhat after the mode prescribed for grape borders in house culture, page 355. If you desire success, prepare them well. There is an equity in the matter: your pay will be according to your labor.

Fig. 308.



Maiden tree cut back and set out for fan training.

Fig. 309.



Young fan-trained tree with its first year's growth of three shoots.

The first step in training is to plant a tree of one year's growth from the bud, technically called a "maiden tree," against a wall or trellis, having first cut it back, if intended to be fan-formed, to within one, or two, or three inches of the point of junction with the stock. Fig. 308.

In planting it, let it be set so that the head of the stock where it was cut down after budding and the face of the new cut made in cutting back the young tree may be toward the wall, and the swell of the original bud growth, with its numerous undeveloped buds, be thrown outward to furnish shoots to radiate from that point for training if it be cut very closely back.

The precise number of buds that are permitted to start the first year may vary, but for illustration I have chosen three as a sufficient and convenient number (Fig. 309).

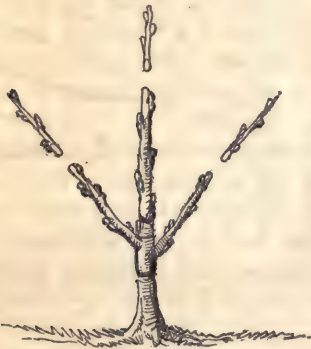
These are to be laid carefully to their proper places as their growth proceeds by nailing them by means of small bands of cloth or leather placed around them, forming, when nailed,

loose loops, through which the shoot runs; and it will generally be found convenient to alternate the sides on which the nails are driven, so that the shoot may be strained in any desired direction. In training immediately upon brick walls, small cast nails are used like those which bootmakers call "sparrow-bills," but larger; but to avoid the necessity of nailing into brick, a frame or trellis, as in open culture, is often set between the wall and the tree, upon which the young shoots may be tied securely but not tightly to their places by strips of bass mat or other material.

All growth shoots thrown directly forward from the face of the tree, and all branching growth from the young shoots that are laid into place, must be suppressed as soon as they start, and all over-luxuriance or disproportion in the growth of any one or more of the shoots of the season must be prevented by watchful summer pruning.

In the winter pruning these shoots of the season are cut back, according to the vigor of their growth, to the length of from ten to fifteen inches, more or less, as shown in Fig. 310.

Fig. 310.



Young fan-trained tree with its first year's growth cut back at the winter pruning.

Fig. 311.



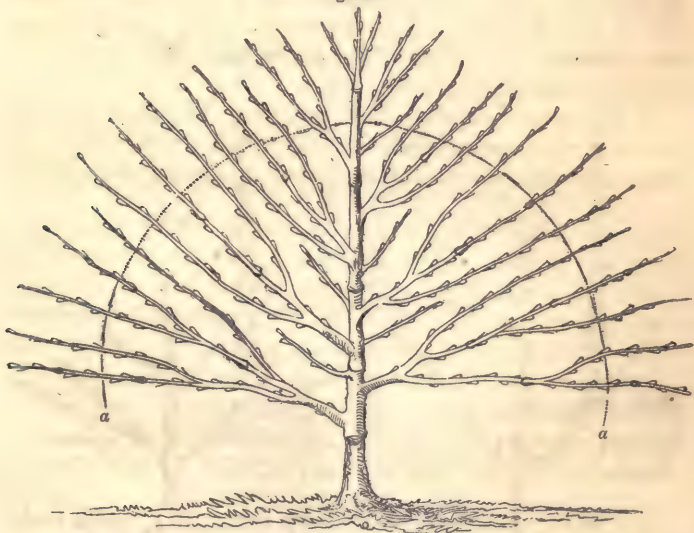
Young fan-trained tree with its second year's growth, each main shoot having thrown out two secondary ones.

From each of them the next season three shoots, a main and two opposite side shoots, may be suffered to grow, as Fig. 311. These, like the former year's shoots, are to be laid into place, summer pruned with the same care, and nailed or tied

as above directed ; cut back each of them at the winter pruning according to the strength of the individual shoot, shortening the secondary shoots in general to about half the length allowed to the main ones, or cutting them nearly as far back as to where the main shoots of the season started, as shown in horizontal training, Fig. 315.

This process is continued from year to year, permitting secondary side shoots to branch off from the main ones as the spaces between them widen with their extension, until the whole surface appropriated to the tree is covered with its growth, regularly laid in against the wall, or fence, or trellis, in a flat fan form, as Fig. 312.

Fig. 312.



A full-sized fan-formed tree. *a, a.* Dotted line showing the point to which a diseased tree may be cut back.

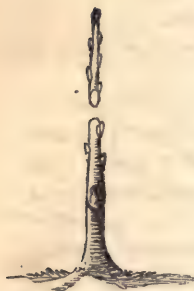
When trained trees have thus filled up their allotted space, they must be absolutely limited to their specific boundaries, and only so much wood permitted to grow from year to year as may be required to fill up the blank spots made by the winter pruning. From the very first the trees are to be carefully

summer pruned, as directed for dwarf trees, page 255; with proper attention to this, so that no shoot is suffered to grow with disproportionate vigor, it will generally be found sufficient, while the tree is forming, to cut annually from the young shoots at the winter pruning about one third or one half the length of the season's growth.

By this course, steadily pursued, the burden of fruit which the tree may become capable of bearing will be concentrated upon and sometimes seem to cover its whole area as it hangs from the numerous fruit branches.

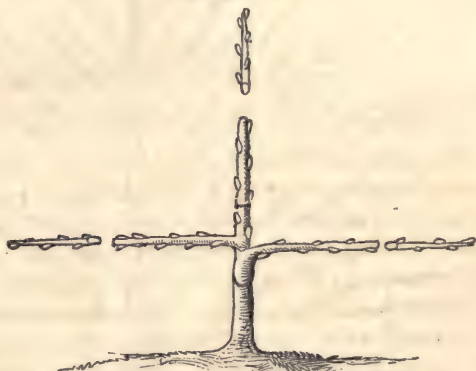
If it is intended to train the tree horizontally, it may either be cut back as above directed for fan training, or may be left six or eight inches long from the bud at the setting out, as shown in Fig. 313.

Fig. 313.



Maiden tree cut back and set out for horizontal training.

Fig. 314.



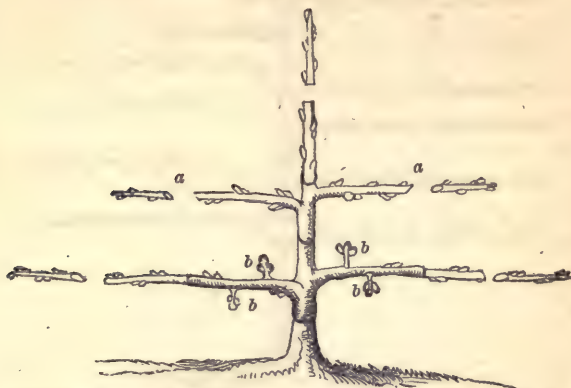
Young horizontal-trained tree with its first year's growth of three shoots shown as cut back at the winter pruning.

One upright leader, with not more than two opposite main side shoots, may be allowed to start the first year, the latter to be trained horizontally, and at the winter pruning each must be cut back as shown in Fig. 314.

In the second year these lengthen from the extreme bud of each, but are not permitted to form secondary side shoots, which, if they put forth, must be nipped throughout the summer; two other main side shoots are also formed and trained

horizontally as they grow. See Fig. 315 *a, a*. These are all shortened at the winter pruning, as also shown in Fig. 315, each shoot being kept about the length of one year's pruned growth behind its predecessor.

Fig. 315.



Young horizontal-trained tree with its second year's growth shown as cut back at the winter pruning. *b, b, b, b*. Spurs with their bunches of blossom buds.

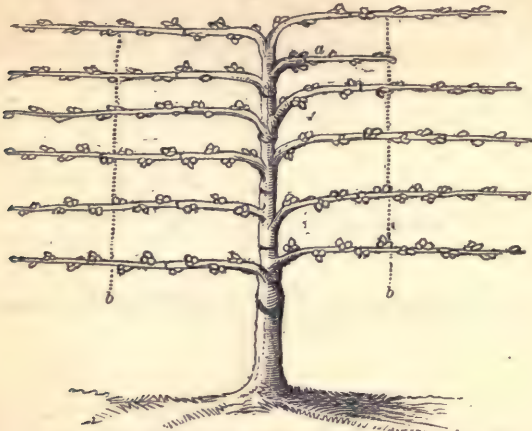
This process, like that of fan-training, with similar care in respect to summer pruning, is continued from year to year until the tree attains its full size (Fig. 316), after which it is simply limited to its appropriate space, and permitted annually to renew by its growth the wastage of its winter pruning.

Under skillful treatment its branches will become studded in the fall with "spurs," which are short stiff shoots from half an inch to four inches long, ending in bunches of full rounded "blossom buds" (Fig. 315 *b*), the ordinary growth or leaf buds being of a more pointed form. Upon these spurs, or from buds set immediately upon the branches (Fig. 316), its burden of fruit will be annually produced, but special care is required in the pruning and general management of trained trees to secure regularly upon them a full but not excessive annual crop of fruit.

The directions given above for regulating the growth and training of the trees are not to be considered absolute; the arrangement may be changed or inverted at the pleasure of the

cultivator, the horizontal tree being permitted to form secondary side shoots, and the fan-formed one being limited to main shoots and spurs.

Fig. 316.



Full-sized horizontal-trained tree covered with fruit buds.
a. A main shoot cut clean out, and a new one forming.
b, b. Dotted lines showing the cutting back of diseased trees.

Under this non-natural course of treatment trees are more than commonly liable to become diseased. Sometimes it is necessary, and still oftener expedient, to renew certain portions of a trained tree by cutting an old main shoot clean out, and forming a new one in its place by gradually carrying a young shoot from the central radiating point, or from the upright leader, annually shortening and pruning it as in forming the tree at first. See Fig. 316 *a*.

If a tree indicates general weakness or disease, and ordinary means fail to renovate it, cut back the whole growth from one third to one half, less or more according to your judgment, as indicated by the dotted lines, figures 312 *a*, 316 *b*. Shorten at the same time the side shoots of the remainder; clear it of insects if infested, by the use of some suitable wash (see page 284); change the surface earth around it, substituting fresh surface loam and rotted sod, and, if it seem requisite, give an extra application of liquid manure occasionally, espe-

cially toward the extremities of its roots ; examine its deep roots, and if the disease is caused by their entering a cold or poisonous subsoil, cut them off ; or, if the case prove inveterate, take up the tree, remove the subsoil as extensively as you find necessary, pave or concrete the bottom of the hole thus made, fill it with good compost, etc., and replant the tree carefully.



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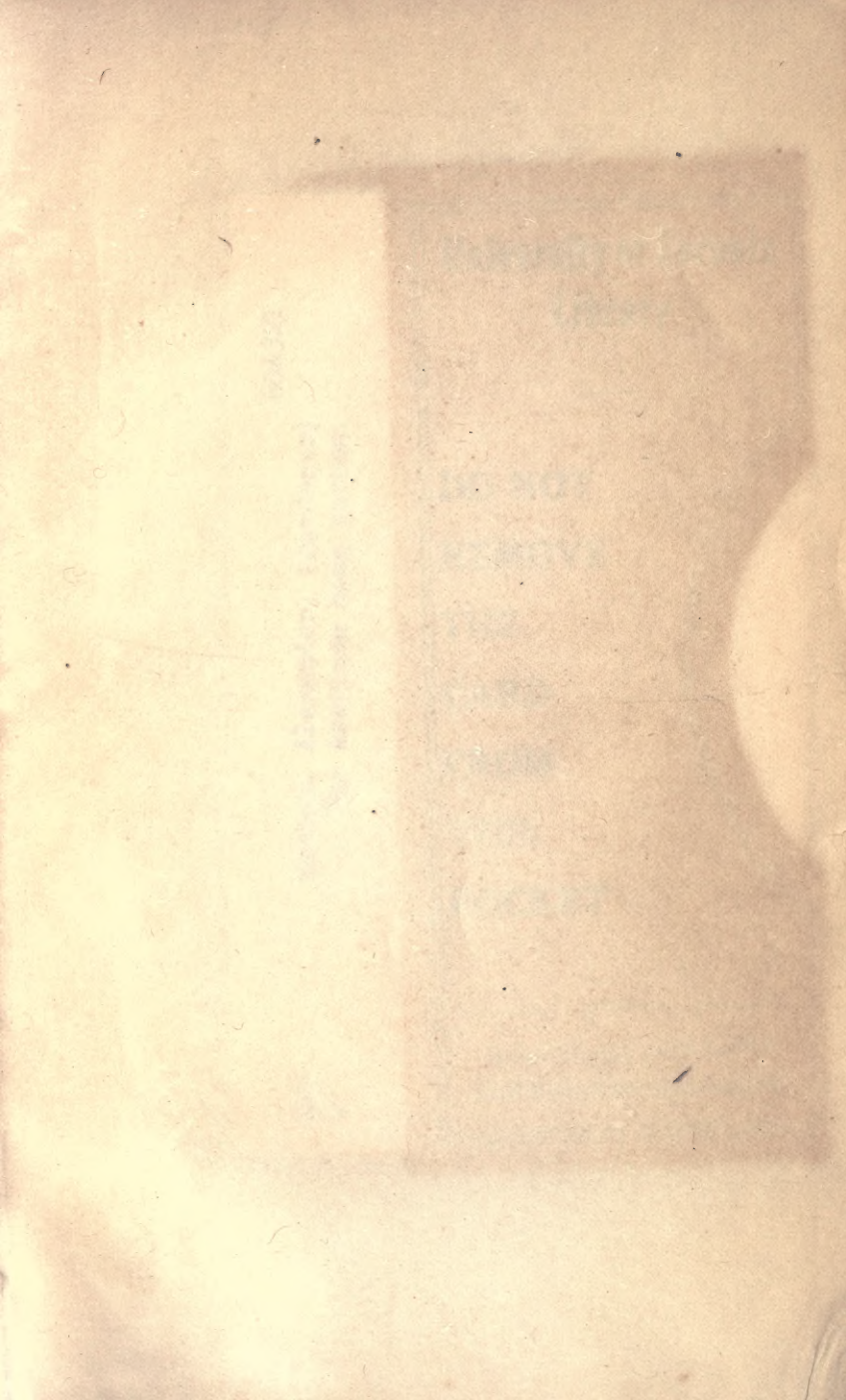
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